THE
ELECTRICAL REVIEW

Volume CXXVII — No. 3283

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Contents

	Page
Editorial : Wholesalers—and Others	339
Shaded-pole Motors. By S. F. Philpott, A.M.I.E.E.	341
Institution Proceedings	343
Correspondence	344
Marine Circuit-breaker	345
The Four-terminal Network. By James Greig, M.Sc., A.M.I.E.E.	346
Factory Lighting. By "Lighter"	347
Personal and Social	348
Relations with Wholesalers. By A Manufacturer's Representative	349
Commercial and Industrial	350
Electricity Supply	352
Transport	352
New Patents	353
Financial Section	354
Contract Information	357

Classified Advertisements (Official Notices, Situations Vacant, etc.)	49
Index to Advertisers	68

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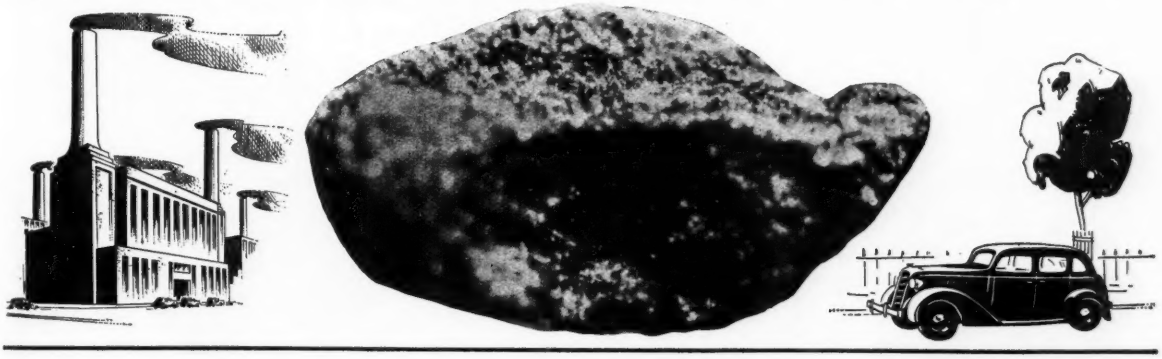

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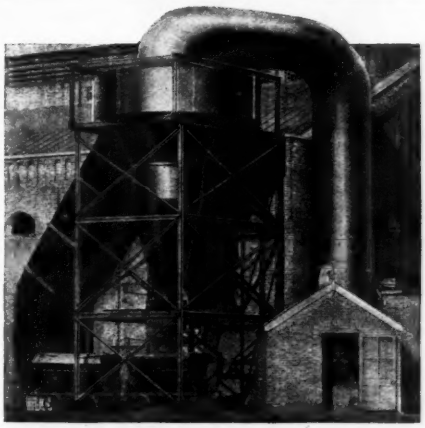

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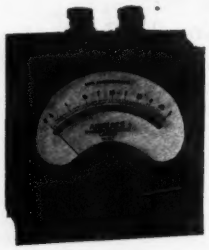

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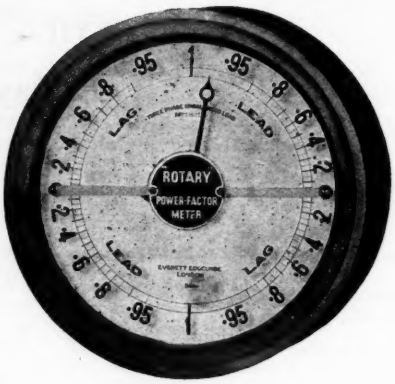

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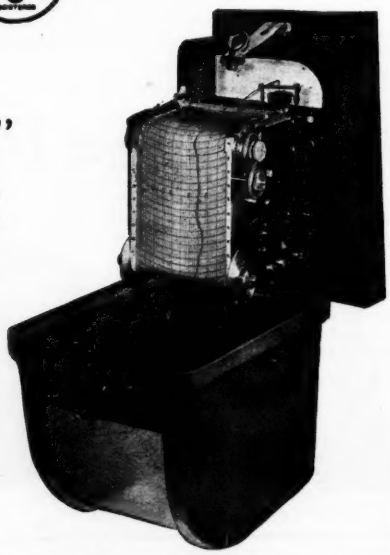

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THE
ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXVII. No. 3283 OCTOBER 25, 1940 Price SIXPENCE

Wholesalers—and Others

Manufacturers' Co-operation Needed

MANY industries have to suffer from the activities of people who seek trade discounts to which they are not entitled. A large proportion, of course, are members of the public at large who cannot be blamed if they try to get goods below the retail cost fixed as being adequate to give a living to people who are engaged in the industry and are doing their fair share of work for it.

Those who are to blame are delinquent members of the industry, or mere parasites, who infringe the rules and for the sake of small gain are willing to give discounts to all and sundry. If these could be weeded out, or persuaded to reform, " discount-snatchers " would find their sources of supply dried up and the industry would be the better for it.

The electrical industry is no better and probably no worse than some others in this respect. Even the most rigid control exercised in certain specialised sections has failed to put an end to the sale of equipment at less than the list prices. So-called " wholesalers " appear to be able to persuade manufacturers that they are carrying on genuine businesses, or perhaps the manufacturers themselves are not always so vigilant as they might be.

Possible Effects of the War

Whether war conditions will lead to deterioration or improvement is an interesting point. While in many directions war brings out the best in the human race it is unfortunately true that it also causes a relaxation of ethical standards. This may prove to be the case in this matter, although it must be confessed that so far as the public is concerned the obtaining of unearned discounts is not a matter of ethics at all, unless underground methods, such as the bribing of employees, are pursued.

Increases in the prices of appliances due to shortage, restriction, Purchase Tax, etc., will naturally cause the public to make greater efforts to obtain goods at less than the proper price. At the same time, however, that shortage will give the goods a scarcity value which may, in some cases, even lead the purchasers to offer premiums for them, so that the " bootlegging " of appliances may adopt quite a different character. Pseudo-wholesalers will endeavour to deprive genuine traders of their living not by undercharging but by securing appliances which are difficult to obtain.

An interesting study of the various types of wholesaler is made by " A Manufacturer's Representative " in this issue. He enumerates six classes and endeavours to show that only three of these are really needed, although he says that one type—builders' merchants —represent a " most interesting and controversial problem." It is admitted that builders' merchants are in the closest touch with architects and building contractors and they consequently represent a useful outlet for the manufacturers. At the same time they deprive the electrical industry of earnings which might be kept in it.

In an industry handling so many lines as ours it is problematical whether there is room for the small wholesaler. The essence of a genuine wholesale business is the holding of adequate stocks of a variety of supplies ; this means locked-up capital or credit to an extent which only a well-established concern of unimpeachable principles can command.

Otherwise the wholesaler is likely to be what the Electrical Wholesalers' Federation used to describe as a " brass-plate merchant," whose functions consist largely of taking orders and passing them on to manufacturers—an entirely superfluous middleman. Such an individual has no experienced staff to give advice and service, which is another mark of the genuine article.

The other two questionable classes of wholesalers are, our contributor says, merely retailers. One class is substantial and able to wield the big stick of threats to place orders elsewhere. The other obtains wholesale terms by the subterfuge of a " wholesale department," the function of which is merely to buy equipment for the retail business.

Fair Trading Policy

" A Manufacturers' Representative " has made no mention of the activities of the Fair Trading Council of the industry ; that is, he has described the malady without saying anything about the possible cure. It is true that the outbreak of war retarded the Council's progress just when it was really getting down to brass tacks and taking active steps to deal with pseudo-wholesalers and the rest of the discount-snatching fraternity. Lists which were in preparation by the Council just before the start of the war contained the names of a large number of these people and if the scheme had been proceeded with a good many of them would have been put out of business.

The Fair Trading Policy defines an electrical wholesaler as " any person or persons, company or firm

whose main business is wholesale distributing; who carries adequate stocks of electrical products on his or their own account at his or their own premises for supplying to electrical contractors, retailers or recognised users; who does not cater for direct sales to the public without the recognised trade reservation; who does not carry out electrical installation work." But room is also found for the "Supplier (other than Manufacturer or Wholesaler)" who is one engaged in selling to the trade and undertakes the same obligations as those applying to manufacturers and wholesalers.

It is incumbent upon manufacturers to ensure that, as far as possible, their products go only to traders who fit into these definitions.

Supply Statistics

WE have previously referred to the decision of the Electricity Commissioners to publish no further annual statistics for the duration of the war. It is some mitigation of the loss to learn that continuity is still to be preserved by requiring undertakings to send in the relevant figures with a view to resuming publication after the cessation of hostilities. While the amount of information that undertakings are now asked to return has been reduced as much as possible, as an emergency measure, it will nevertheless be enough to provide similar data to that included in the last volume issued (1938–39). The figures called for are in any case no more than any undertaking should have got together for its own purposes.

Standing Up to It

AFTER the intensive air attacks on London, it is gratifying to learn from reports that reach us how well electricity supply has borne the strain. Interconnection of generating stations through the grid has more than justified anticipations as to the value of the standby it would afford in emergency; cables in the streets, owing to their mechanical flexibility and aptitude for easy repair, have suffered relatively little compared with other public services; electrified railways have fulfilled the expectations of those who held that the likelihood of damage done to electrical equipment would be very small compared with that inflicted on parts of the system common to all rail traction. Finally, there is the way in which the operation and maintenance staffs have carried out their duties in the most trying circumstances. This was expected of them—at any rate, by any who know the men concerned. History will no doubt regard their labours as heroic; they themselves, we find, prefer to regard them as a job of work. Nevertheless, it is pleasing to see that official recognition is to be accorded to outstanding examples of gallantry in the carrying-on of electricity supply.

An Engineer Administrator

PROBABLY the place that history will assign to the late Dr. Charles Merz, to whose career we refer elsewhere, will be in close association with two other Faraday Medallists, Parsons and Ferranti. The steam turbine of the one and the high-voltage AC transmission of the other came into their own at the beginning of the century by means of the co-ordinated electricity supply system devised by Merz on the North-East Coast, the general lines of which have since become standard practice throughout the world, in many instances under his own supervision. Although his name is often associated with technically advanced generating stations and transmission systems, Dr. Merz consistently adhered to the principle he enunciated in an I.E.E. paper in 1904, that design considerations should be subservient to the commercial success of the undertaking as a whole. Indeed, the high importance he attached to the latter aspect was evident from the keen interest he always took in load development. To those who knew him professionally he appeared a quietly impelling personality, possessing great administrative gifts which included a rare judgment of character. His breadth of outlook and his imaginative insight into engineering problems have been a source of inspiration to many who have laboured with enthusiasm to build up a great public service.

Shipyard Lighting

ALTHOUGH the design of lighting fittings that enable certain essential work to be carried on out of doors (with police permission) during hours of darkness is most creditable to those concerned, the problem is still far from being solved for all cases. In his presidential address to the Association of Supervising Electrical Engineers last week, Mr. H. W. Swann, who as Senior Electrical Inspector of Factories comes up against most of the difficulties of production in the face of enemy activities, propounded a conundrum for the spare-time study of his listeners. The question he sets is how to light the underside of a ship in the slipways in the interest of safe and accurate working and at the same time to prevent an upward throw of light that may be visible from the air. In some cases complete enclosure of parts of a shipyard has been found necessary. The same consideration applies also to the exterior parts of some factories and anything that could be devised to obviate the need for such action would be an inestimable boon.

Heat Release

As a criterion of boiler performance figures relating to the number of BThU liberated per cu. ft. of furnace volume need to be supplemented by particulars of evaporation or coal burned per hour. Writing in the *Fuel Economy Review* (a publication of the Federation of British Industries) Mr. E. L. Luly suggests that the expression "heat release per sq. ft. of radiant surface" should be substituted for "heat release per cu. ft." in referring to liberation rates, as the rate at which radiant heat is absorbed by the furnace walls depends upon the amount of coal burned per sq. ft. of radiant heating surface. Because the ratio of surface to volume lessens as the cubic content increases, high liberation rates have been achieved with small laboratory apparatus that cannot be attained with full-sized plants.

Arc-over Voltages

WHILE the decrease of breakdown strength of gas-insulated high-voltage equipment due to irregularities on metal surfaces has been a subject of intensive study, less attention has hitherto been paid to the lowering of arc-over voltages that may be caused by solid-dielectric projections, particularly in relatively large gaps. Experiments carried out by Dr. H. H. Race to determine such values quantitatively are described in the *General Electric Review*. These show that at 60 cycles small projections of either solid dielectric or metal have similarly large effects, caused apparently by greatly increased gradient in the adjacent air. Large projections of wet press-board are comparable to metal, the arc striking directly to them, and give appreciably lower arc-over voltages than dry press-board and mica. The same feature was evident in tests with 1.5 by 40 micro-second impulses when the projections were positive. In negative-impulse tests, the effect of small projections of metal or solid dielectric was negligible; large projections of dry dielectric were much better than wet press-board or metal. These experiments indicate the difficulty of realising the ultimate dielectric strength of gaseous insulation for given electrode spacings.

SHADED-POLE MOTORS

Characteristics and Construction

By S. F. Philpott, A.M.I.E.E.

THE shaded-pole motor—so called because part of each pole is surrounded with a shading coil for starting—is the cheapest and most reliable of all small motors. It has a number of advantages that make it a particularly suitable unit for such things as fans, electric gramophone turntables, advertising devices, automatic radio tuning, hair dryers and instruments. With a gearbox attachment it is very popular for slow-speed drives.

This type of motor is very simple in construction and is thus cheap to manufacture as compared with other kinds of similar dimensions. It is reliable because there is so little to go wrong. There are no brushes or other rubbing contacts, nor any internal automatic switches, which may get dirty and cause trouble. Because of the absence of such contacts, and the general simplicity of design, the shaded-pole motor is quiet in operation and causes no interference with radio.

The winding of the shaded-pole motor is of the simplest and unlikely to give trouble, and the motor is switched straight on to the line, without any special arrangement for starting.

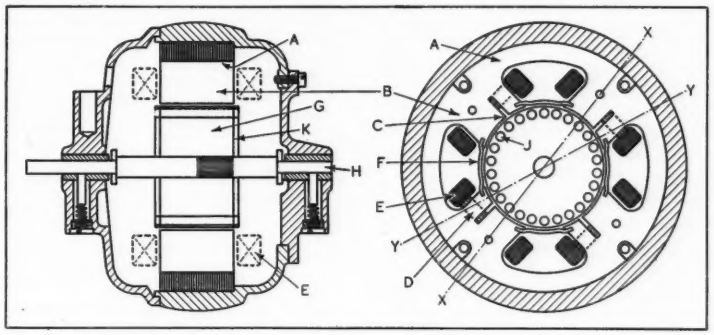


Fig. 1.—Typical shaded-pole motor

Speed Control

The motor can be slowed down mechanically or even stalled for a period without harm ; in fact, in some applications the motor only provides torque and although always in circuit the rotor never actually rotates more than a fraction of a revolution. The speed can also be controlled by a series resistance or reactance. The same winding can generally be provided to cover a wide voltage range, 200 to 240 V, for example, and it is found that voltage variations have little effect on running speed.

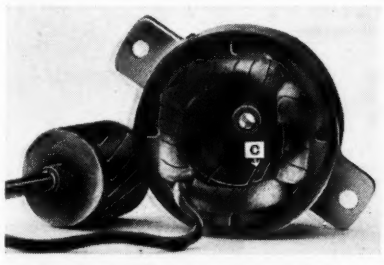


Fig. 2.—Stator and rotor (G.E.C.)

There are, however, some disadvantages which may militate against the use of the shaded-pole motor in some circumstances. It is only suitable for single-phase AC and, as with all induction motors, its speed is governed by the number of poles in its stator and the frequency of supply. Thus for a 50-cycle supply the highest possible speed is something less than 3,000 RPM for a two-pole motor and 1,500 RPM for a four-pole motor.

The slip is greater than in other forms of induction motors. The running speed on full load is usually about 1,250 to 1,300 RPM for four-pole and 2,500 to 2,600 RPM for two-pole motors at 50 cycles, but the speed can be controlled to some extent. Appliances requiring higher speeds than these would require some form of step-up gearing, but this is rarely adopted, the " universal " series commutator motor being used instead.

The speed of a shaded-pole motor varies more in proportion to the load than it does in other induction motors. In applications such as fans the load is constant, being determined by the size and shape of the blades, and the speed remains constant.

In cases where there are wide fluctuations in load, such as in the electric gramophone turntable, a governor is provided to overcome any fluctuations in speed which would be detrimental to the playing of the instrument.

In a number of applications, of course, slight variations in speed with load do not matter, e.g., advertising devices and motor-operated valves.

The efficiency of the shaded-pole motor is very low (8 to 12 per cent.) for two reasons. Current flows in the shading coils the whole time the motor is running, and the salient-field pole construction does not permit a sinusoidal distribution of flux as good as in slotted split-phase stators with distributed windings. However, in most small power appliances the energy consumption is so small in comparison with their utility—even in an inefficient motor it need not exceed 20 to 50 W—that electrical efficiency is not nearly so important as low initial cost.

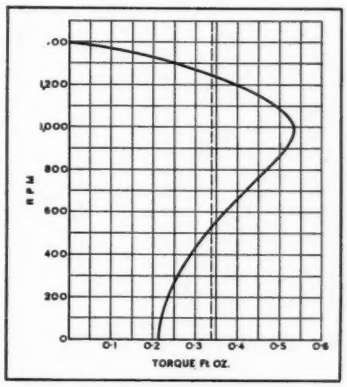


Fig. 3.—Speed-torque curve for a 1/200 HP machine

On account of their low efficiency shaded-pole motors are rarely made above 1/200 HP for continuous operation. Higher outputs are available in short-time rated motors. Another disadvantage of the shaded-pole motor is its low starting torque, which is generally less than full-load torque. None of the applications mentioned above calls for any great starting torque ; for example, the load does not come on a fan until the blades are revolving, and the gramophone turntable is invariably running before the needle is put on the record.

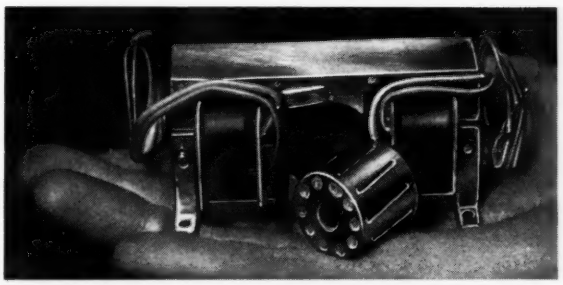


Fig. 4.—Two-speed motor for use in restricted space

On account of the small HP output and low inherent starting torque particular care is required in manufacture if wide variations in performance between supposedly identical machines is to be avoided. Bearing frictional loss bears such a high ratio to the total output that slight departure from standard either in fit or finish of the shaft and bearings, pressure of the lubrication pads, or in the general alignment and building of the motor will cause trouble.

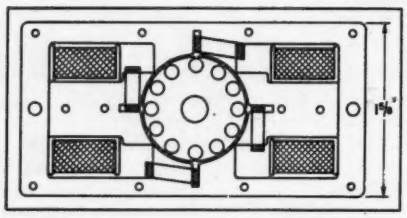


Fig. 5.—Arrangement of motor shown in fig. 4

The characteristics of a shaded - pole motor may be modified by suitable design to suit particular applications—generally at the expense of some other characteristic. For example, a higher starting torque than normal gives excessive temperature rise on continuous load, and such high-torque motors are therefore invariably short-time rated. Another point which may cause difficulty in some applications is that the ordinary shaded-pole motor cannot be reversed, but reversing models of less simple construction are available.

The motor shown in figs. 1 and 2 has four poles and therefore a synchronous speed of 1,500 RPM and a full-load speed of about 1,300 R P M. The stator A is built up of a large number of sheet-iron laminations (about 0.018 in. thick) riveted together to form a solid block.

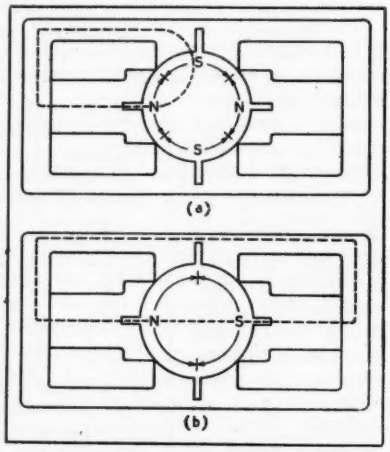


Fig. 6.—Flux distribution: (a) four-pole machine; (b) two-pole

The stator has four internally projecting poles B, and each pole has a slot C. Enclosing about one-third of the pole and occupying slot C is the copper shading ring D—usually made of strip copper and soldered to form a complete loop. Surrounding each pole is a taped coil of insulated wire E. These coils are connected in series so that adjacent poles have opposite polarity. Between each pair of poles is an iron strip F which, besides its true purpose of evening the distribution of the magnetic flux, keeps the coils in position.

The rotor core G is also made of iron stampings which are pressed on to shaft H. The stampings have a number of round slots J in which copper bars are inserted. At each end of the rotor is a copper stamping K similar to the iron stampings. The copper rotor bars enter the holes and are soldered. Brazing is not usually resorted to in these small motors. An alternative construction to the copper bars and end plates is to make them a solid casting of aluminium, as seen in fig. 2. In manufacture the stampings are placed in a die and the molten aluminium poured around them.

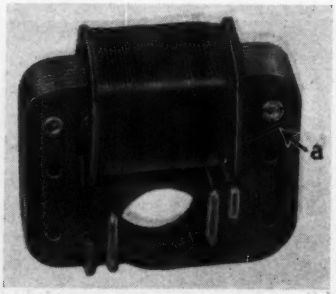


Fig. 7.—Stator of shaded-pole motor with stampings in one piece and only one coil

When current is switched on each pole is magnetised. The growth of the magnetism in the small "shaded" portion is, however, retarded due to the effect of the current induced in the copper ring, with the result that at one instant the line of maximum magnetisation is along line XX. An instant later the shaded portion attains maximum magnetisation, during which time magnetisation in the unshaded portion has begun to fall, with the result that the centre line of maximum magnetisation moves to line YY.

Then, with the reversal of the current in the next half cycle, the polarity of the poles will change and the line passes to the next pole. The total effect is to give a magnetic field always rotating *from the unshaded to the shaded* portion of the pole. These rotating lines of magnetic force cut the copper conductors in the rotor, induce current in them and set up a rotor magnetic field, which follows the stator field around, and rotation is thus obtained.

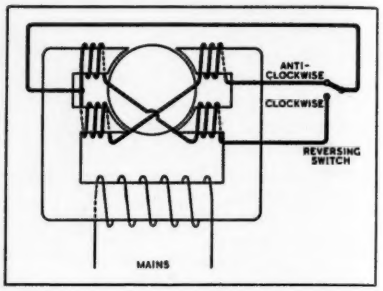


Fig. 8.—Diagram of reversible shaded-pole motor

Shaded-pole motors are usually designed to operate at the point where the speed tends to fall off appreciably with increase in load to secure best efficiency and output.

When speed variation is desired, with a fan, for example, the general method of control is to introduce a variable resistance, or more often a tapped choke coil, in series with the motor. In gramophone motors, where constant speed irrespective of load, together with some choice in the optimum speed, is desired, a centrifugal governor is used. In this device there are three weights which are thrown out by centrifugal force as the motor revolves and in so doing draw a revolving plate against a felt brake pad. The faster the motor goes the more the weights will be thrown out and the harder will the plate press on the felt, and *vice versa*. By suitable design of the governor and brake the speed can be made to remain almost constant over a wide range of loading.

The motor shown in figs. 4 and 5 is a design modified for use in a restricted space. It has four poles but only two coils, which are normally connected so that the poles on which they are situated are similar. If they are of N polarity at a given instant then the intermediate unwound poles will become S, and the motor runs as a four - pole machine (1,500 RPM synchronous). (Fig. 6a.) If, however, the connections to one of the coils is reversed, the magnetic flux redistributes itself as in fig. 6b and it then runs as a two-pole motor at twice the previous speed (3,000 RPM synchronous). The coils are normally connected in series for 200 to 250 V, but if connected in parallel the motor can then be used on 100 to 130-V circuits. The coils are wound on spools instead of being taped.

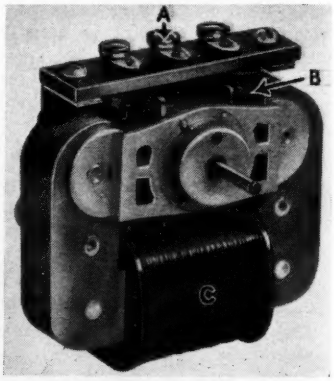


Fig. 9.—Reversible machine (Barber-Colman, U.S.A.)
A. Terminals for reversing switch connection.
B. Reversing coil. C. Main coil.

The stator of another type of shaded-pole motor, a two-pole 2,600-RPM machine, employing only one magnetic coil, is shown in fig. 7. The stampings are made in one piece, but cut through at point "A," and are inserted in the coil one by one from alternate ends and afterwards

INSTITUTION PROCEEDINGS

Inaugural Addresses for 1940-1941 Session

Wartime Factory Problems

THE inaugural address prepared, but not delivered, by Mr. H. W. Swann (Home Office Factory Inspectorate) for his second term of office as president of the ASSOCIATION OF SUPERVISING ELECTRICAL ENGINEERS followed the outline he gave a year ago, with a few details of some of the work with which he has been connected.

Thus he observed that the routine tests which many authorities organised last autumn to ensure the correct operation of electrically driven air-raid sirens had proved their worth in recent weeks. With the advent of winter maintenance assumed increasing importance. The construction of their voice boxes rendered the sirens somewhat liable to freeze up in cold weather. Full scale tests in a cold room at temperatures below anything likely to be encountered in this country had enabled suitable means of electric heating to be evolved to prevent the sirens being rendered useless by ice formation. Heating had proved to be more reliable than slow running and it could be automatically and easily controlled by thermostat. It was not essential that the latter should be in metallic contact with the sound boxes. To guard against damage resulting in failure of supply, full sized transportable sirens had been mounted on trailers for towing behind normal types of electric vehicles, drawing their supplies from the vehicle batteries. This arrangement was mobile only for transport and would remain stationary when in use.

The adequacy of factory lighting had generally received much attention; where the black-out arrangements had been made permanent, complete revision of the peacetime arrangements was often necessary. Not infrequently the standard of lighting had been brought to a pitch considerably higher than those previously accepted.

Treating the public air-raid warning as an "alert" signal and the institution of roof watchers had necessitated some means of conveying the last-minute warnings to the factory personnel, which had not been made easier by the Restriction of Noise Order. Some factories had already been equipped with loud-speakers for the dissemination of music and announcements, which system appeared to lend itself to the giving of last-minute warnings. No single system of warning was applicable to all factories and experimental work was still being done to devise simple and reliable methods of conveying the warning.

It was pleasing to be able to make some acknowledgment of constructive suggestions and to the ready response of manufacturing interests which were always willing to lend assistance in research and the development of ideas. At the present time when every works was full to capacity, this assistance was costly to manufacturers but had proved of great value to his Department.

Within the last year the formation of local schemes of mutual assistance following air-raid damage had developed considerably, not only in the electrical sphere, but also in the sphere of general engineering. Although much remained to be done, the progress made was valuable, particularly when it was realised that long distance transport might be badly hampered by raid damage. Thus, local reserves of equipment, coupled with arrangements for the loan of skilled labour, might prove of much value in effecting raid repairs.

Sufficient experience had now been obtained to show that the recommendations which had been made regarding the protection of vital electrical plant from air-raid damage were well founded, but Mr. Swann stressed the necessity of segregating electrical plant as much as possible, even to the extent of some inconvenience of operation. Much could be done in this direction by suitable arrangement of walls of dry brick, or hollow concrete block construction. Some degree of overhead protection against splinters and small incendiary bombs was also desirable.

By no means unimportant was the necessity of carrying sufficient spare parts for the repair of electrical and other equipment. Manufacturers were less likely to be able to supply spares with the same promptitude as was expected in peacetime, particularly when old gear was concerned and the design obsolete. In one such case certain large users of obsolete gear had combined to form a pool of spares.

Street Traction Development

THE development of electric street traction was surveyed in the inaugural address prepared by Mr. H. R. Beasant (chief electrical engineer, Bristol Tramways & Carriage Co., Ltd.) as chairman of the Western Centre of the INSTITUTION OF ELECTRICAL ENGINEERS for delivery at Bristol on October 14th. The system with which he is associated is believed to be one of the earliest of electric tramway systems, the use of electricity for propulsion in the streets having been authorised by Act of Parliament in 1894. The address commenced with descriptions of the original generating station erected for the tramway system, its subsequent enlargements and modernisation.

Turning to rolling stock, Mr. Beasant referred to the results obtained with early motors as really remarkable, especially considering that in Bristol the main service braking had always been effected rheostatically. Bristol was a very hilly town and the work put upon the motors had been heavy. In 1907 experiments with the Raworth system of regenerative control showed that while it was true that regenerated energy measured on the car approximately equalled 25 per cent. of the energy taken from the line, also measured on the car, the net result at the power station was negligible owing to the greater current demand when motoring. The use of shunt-wound motors was proved to be impossible in a hilly town. With modern compound-wound motors, heat-proof insulation, interpoles, and better motor ventilation, regenerative braking was serving a very useful purpose and under certain conditions might be the best system to employ.

Paper-insulated, lead-covered cables in a wooden trough filled with compound and with wooden cradles were the most troublesome in use, owing to corrosion of the lead sheathing in contact with decaying wood. Cable testing with DC at full B.S.S. voltages proved invaluable in spite of some misgivings when first brought into use. It was reasoned that it was better to break down a doubtful cable at a convenient time than leave it to fail at an inconvenient time. The result fully justified the method. There was confirmation of its usefulness in a recently published E.R.A. report.

In fault location on low-voltage traction cables (all being single core) it was often very inconvenient to obtain a return cable of the same order to complete an orthodox loop, so a method was developed making use of two pilot wires which might be of any size provided the insulation resistance between and to earth was good. The method entailed very careful preliminary testing to determine the loop resistance accurately, the conductor resistance of one pilot wire being included in one bridge arm, the other pilot acting as a galvanometer lead. This test had been applied with much success with a number of types of pilot cable, even by using the two trolley wires as pilots.

The distribution department made good use of a one-ton electric truck. In addition to providing economical transport it had been invaluable (with its battery) as a portable source of power for testing, operating portable pumps, electric drills and lighting for night work.

Experiments had been proceeding for several years with trolley collector wires and there had been a tendency in some quarters to press for extreme tensile strength, but at present a cadmium-copper alloy giving a tensile strength of about 35 tons per sq. in. seemed the best for traction purposes.

Pole alteration had been in the materials used and consequent section required, without the performance specification being

(*Continued on next page.*)

Shaded-pole Motors (*Concluded*).

riveted together. This gives a very cheap construction. In this example there are three shading bands, embracing different arcs, on each pole.

Since the direction of rotation is from the unshaded to the shaded portion of the pole, in order to effect reversal it is theoretically necessary to transfer the shading band to the previously unshaded portion of the pole. This is impracticable, however, except in the case of some motors which happen to be so built that the stator can be removed, turned round and replaced.

Shaded-pole motors for electrical reversing are designed as shown diagrammatically in fig. 8. Instead of shading bands, two small coils are mounted on each pole and the connections are such that the lower coil on one side and the upper coil on the other side are connected in series. When one pair of coils is short-circuited, current is induced in them due to the stator flux, the other coils remain open-circuited and non-effective. When the short-circuit is transferred to the other pair of coils (by operation of the switch) the rotor revolves in the other direction.

CORRESPONDENCE

Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication. The Editors cannot accept responsibility for correspondents' opinions

Technical Training

I WAS greatly interested in the article by Mr. E. B. Watton, A.M.I.E.E., in your issue of October 4th, as I have been trying for many years as an employer to point these things out, both in your columns and elsewhere. The whole truth of the matter is that technical training is based on Chartered Institution requirements, and these in general, and the I.E.E. in particular, have been straying from their real fields for some years, making the mistake of demanding a disproportionate amount of theoretical knowledge. They were granted charters to serve the public but instead of turning out useful electrical engineers appear to have concentrated on producing the wrong type.

What the public and employers require is the sound practical electrical engineer not the brilliant theorist who is useless on design and manufacture. This type is valuable, of course, and a limited number are no doubt required, but why make the minority the standard ? During some forty years in the electrical field I have met many extremely capable electrical engineers, a number running large power stations, who openly admitted that they could not reach the standard demanded, yet they were the real type when trouble arrived. Obviously, then, if the Institution is going to lead, and the word " chartered " is going to mean anything, this state of affairs will have to be put right ; the educational establishments will then soon fall into line.

October 11th. THRICE CHARTERED.

Rectifiers for Plating

The author of the article on this subject in your issue of October 4th has either tried to cram a large subject into a small space, or his experience hardly warrants its inclusion.

The advantages of rectifiers against motor generators can be argued at great length, but the plain truth is that for some purposes rectifiers are definitely superior. In others there is nothing to choose between them and motor-generators, and in still further cases a motor-generator is infinitely preferable. Furthermore, his experience of the application of low-voltage electricity must also be somewhat limited, and from his description more applicable to general practice thirty or forty years ago. The reference to voltage being " thrown away " is perhaps intelligible, but does not exactly cover the real watt loss incurred. In any event, the disadvantage applies to both rectifiers and motor-generators.

Then, again, he says that rectifier plates are susceptible to corrosive atmospheres. Nobody will dispute this, but when he says that rectifiers cannot be mounted in the plating room it is evident that he has no knowledge of, or is unfamiliar with, the oil-immersed rectifiers of which there are many in use fixed in the plating department.

The general application of individual rectifiers for each plating process is usually adopted in the modern electro-plating shop. Plating plants are now much larger in capacity than was the case many years ago, when watt losses due to series resistance on each individual vat really represented a very small item, as vats were small. To-day there is a tendency to install automatic and semi-automatic plating equipment necessitating electrical units of from 1,000 to 10,000 A capacity, when, of course, the problem becomes totally different, and the necessity for fine control and maximum efficiency are imperative. Oil-immersed rectifiers of the larger sizes are usually water-cooled, the circulating water being ultimately used in supplying swill boshes used in the plating process.

In discussing the control of rectifiers he refers to 10-point rotary switches but omits to mention that there is an ampere-limit to the present manufacturing capacity of these, and the only really satisfactory control of the larger units is by means of auto-transformers, or induction regulators.

Finally, he attempts to prove that rectifiers are better for metal refining, but in actual practice the number of rectifiers compared with motor-generators used for this purpose is comparatively small, although there is no reason at all why they should not be used, but this is the one case where it is not possible to point to the greater efficiency of the rectifier as compared with a motor-generator, because these plants are usually worked under full-load conditions. A separately excited motor-generator permits excellent voltage control for all purposes of metal refining, and there is generally no other disadvantage if the power supply is restricted or even stopped during the process.

Birmingham, *Oct. 11th.* W. CANNING & CO., LTD.
Geo. A. Pope, *Managing Director.*

Institution Proceedings (*Concluded*)

materially changed. Whether or not it was considered an improvement depended on the point of view ; if the criterion were the weight and cost of new poles, there had been a big improvement, but if the poles were to be judged by their resistance to damage by corrosion and shock and also by ease of maintenance, the older poles were superior. Reinforcement with steel rods and cement grouting had been adopted in a number of towns to strengthen existing poles to withstand the greater stresses imposed on changing over from tramcars to trolley-buses.

The regulations now in force relating to what is probably the street traction engineer's greatest bugbear, i.e., damage and alleged damage to the property of other authorities by stray currents, were substantially the same as those first issued. Unfortunately, they applied only to tramway undertakings and there was no corresponding set of rules for the owners of other cables, pipes, &c., laid in the road.

Compliance with regulations by tramway authorities must be supplemented with equal care by other road users in both layout and methods of construction of cable and pipe systems if danger from stray currents was to be minimised. A new code had been drafted, but the outbreak of war had, at least for the time being, delayed the completion of this work. Among its important recommendations was the substitution of average values of potential differences for the impossible transient maximum values of the old regulations.

Scientists and the Nation

FOLLOWING an informal luncheon in London on October 17th a short address, which he prepared to mark the commencement of the 1940-41 session of the INSTITUTE OF FUEL, was delivered by Mr. W. M. Selvey, who has for some time been the acting president while Lieut.-Col. J. H. M. Greenly was in America.

The Institute, Mr. Selvey pointed out, was holding firmly to its comparatively short tradition ; new membership applications had been continually received and mostly accepted. The diversity of interests was most marked—solid fuels, electric power, gaseous and liquid fuels, all had their experts among the membership which formed a community of interest.

Passing to personal reflections, Mr. Selvey remarked that the problem whether scientists were morally justified in increasing physical knowledge to be put to such dangerous uses would not be solved by smothering the scientists, or putting the technologists on the " dole," but rather in considering what sort of men should ultimately compose that small inner coterie existing in every country which had the power and responsibility of putting great forces into action. Those men to-day were primarily educated in what used to be called the " humanities," which form of education led to an astute knowledge of how to govern men through their lesser qualities and, indeed, their weaknesses.

The growing reaction against this form of education of the finest minds had resulted, not in changing their form of education, but in replacing them by representatives of the " people," mostly great-hearted men, but who had this in common with their colleagues of the former type : that in discussions of any grave difficulty they could always brush aside questions which demanded answers by saying they were purely technical. It was a most amazing state of affairs that in a world which was fast becoming wholely technical, the men having the power and responsibility could almost boast of their ignorance of technical questions. One should, however, consider deeply that there were countries where the men in real power were technically trained as a basis for their future activities, educated to some degree in the scholastic field of knowledge, but totally devoid of morals when acting as functionaries of the State. The jibe that technologists did not make successful administrators would, so long as Government turned on the management of men by their foibles, always contain an element of truth.

The matter must be dealt with at an earlier stage. It was not more difficult to distinguish among young technologists than among young classical graduates what men were likely to develop into administrators. There was growing consciousness that something must be changed before it was safe to put further powers evolved by scientists and technologists in the hands of those governing the political fortunes of the State. But the scientists and technologists must go on ; therefore, it must also follow that they must themselves delve deeper into those questions which they in turn had been equally amiss in shelving as political, moral, ethical and religious. One could not perpetuate watertight divisions of thought, action and responsibility and continue modern civilisation.

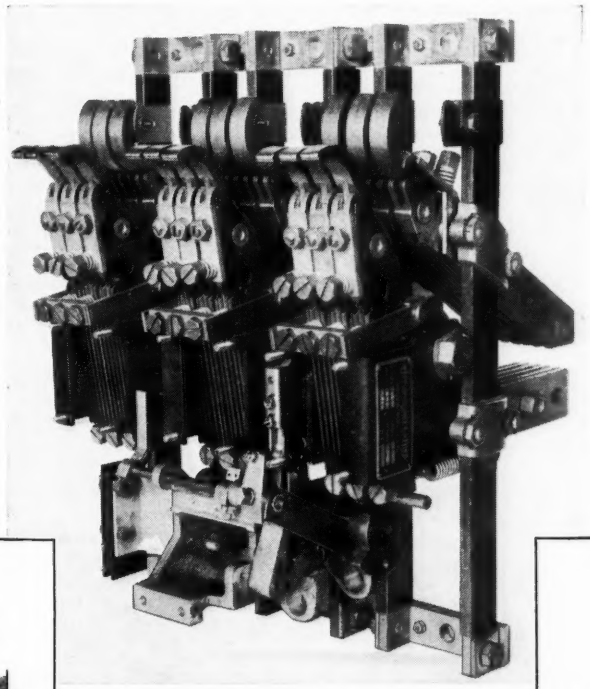
MARINE CIRCUIT-BREAKER

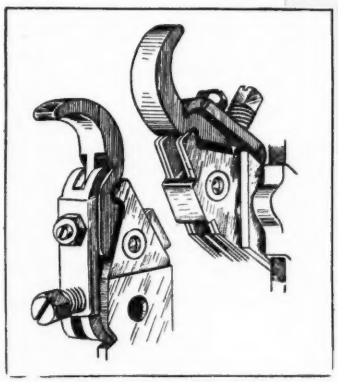
An Unorthodox Design

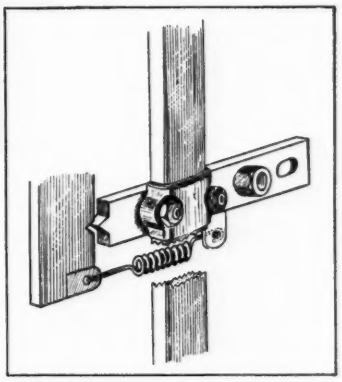
AN uncommon type of circuit-breaker, specially designed for naval use, but equally suitable for many industrial purposes has been designed by Mr. Paul Branchu, and so constructed that it can be mounted flat against a wall, all the parts being accessible and demountable from the front with a minimum of tools. One wrench is sufficient to take the whole switch apart and put it together again, while the whole locking mechanism if out of order can be removed and replaced by a spare in 34 seconds using only one's fingers. Another feature is the special system used to avoid arcing between the contacts when opening and closing the circuit, the main feature of which is a novel type of arcing horn.

The cut-out is built in units, each comprising one pole, which can be mounted either above each other or one next to the other, according to the space available. Each unit consists of a pair of insulated upright bars supporting through-bars which are laminated according to the capacity required, to the rear ends of which cable lugs may be attached. The upper member is inclined to form the fixed contact; the lower one is horizontal, its front end terminating in a knife-edge fulcrum that fits into a notch near the lower end of the upright moving contact arm, which is also laminated.

This fulcrum joint replaces the usual hinge and flexible "pig-tail" connector, also simplifying construction and repair. In order to ensure good contact and reduce resistance which might be introduced by oxidation at this type of hinge, both the notch and fulcrum surfaces are heavily coated with pure silver.







Circuit-breaker designed by Mr. Paul Branchu, showing method of attaching arcing horns (left inset) and fulcrum hinge (right inset)

Each of the bars composing the movable arm is individually held against the lower articulation joint by means of a spring (shown in inset diagram) which ensures good contact. Both the movable and fixed arms are provided with heavy contact blocks of pure silver, which offers minimum resistance. Moreover, the silver is soft enough for any roughness of the contacts caused by arcing to be smoothed under the closing pressure of the movable arm.

Reduction of Arcing

To reduce arcing at the contacts to the minimum arcing horns of rather curious design are added, as shown in the inset drawing. One horn rests on the end of the movable arm and the other on the end of the fixed arm in similar notched fulcrum manner. Each horn is held in position by a bar, both ends of which are bent over and sharpened into knife edges. One of the ends of this bar rests in a notch cut in the arm while the other end engages in a notch in the horn.

The bar is held in place by a bolt pivoted by its head to the arm, over which a helical spring is slipped to press against the bar and hold its ends firmly in the notches. A setscrew in the bar forms a stop for the end of the horn.

When the movable arm begins to open the silver main contacts separate first, so that current flows entirely through the horns. As the main contacts continue to separate, the pressure of the bars on the horns causes them to maintain contact, at the same time rolling the horns of the movable arm against those of the fixed arm. This conntiues until the end of the horn comes into contact with the setscrew, the position of which therefore determines how far apart the main contacts will be before the horns stop rolling against each other and are able to separate, any arcing involved in the opening taking place between the horns.

It sometimes happens that an incipient arc welds the two horns together so that they cannot separate. If this should occur the rolling of the horns against each other will continue, this movement lifting the end of the bar and compressing the spring on the bolt until the combination of the rolling movement and the pull of the spring breaks the weld and in this way allows the horns to fly apart.

The operating mechanism of the circuit-breaker is of more usual type. It works on the so-called "broken tie-rod" principle, the control arm being in two sections, held together by a small hook. When this hook is raised by the electro-magnetic relay on the movable arm, the cut-out is opened.

The design of the contacts is such that electro-dynamic repulsion is set up between them as soon as a short-circuit occurs. This repulsion, combined with the quick-operating mechanism, permits the cut-out to open a short-circuit in a period of less than 0.02 second.

Australian Electrical Industry

REMARKABLE growth has taken place in the Australian electrical industry, states the *Electrical & Radio Trader* (N.S.W.), and in the seven years from 1931 to 1937, the number of factories has increased from 231 to 318, while the number of persons employed has risen from 4,098 to 9,215. Products of factories manufacturing electrical goods has reached an annual value exceeding £5,000,000.

THE FOUR-TERMINAL NETWORK

Application of the Reciprocity Theorem

By James Greig, M.Sc., A.M.I.E.E.

IN the theory of power transmission the so-called linear parameters of the four-terminal network are found to be of great service and are widely employed. It is customary to set down the fundamental equations with reference to the system of fig. 1 in which the "box" labelled ABCD represents a passive linear network of any degree of complexity. The terminals 1, 1′ and 2, 2′ will normally represent input and output terminals and the box a transmission system.

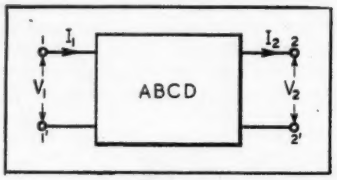


Fig. 1.

That the transmission network is passive and linear means that between the input and output terminals there are no sources of e.m.f. and the resistance, inductance and capacitance of the circuit elements are constant. The fundamental equations are usually stated as follows :—

$V_1 = AV_2 + BI_2$.... (1) and $I_1 = CV_2 + DI_2$.... (2).

The conventional positive directions for current flow are given by the arrows. For fall of potential the positive direction is taken as from 1 to 1′ and 2 to 2′. A, B, C and D are constant complex numbers, functions of the impedances comprising the network and are termed the linear parameters of the network. Equations (1) and (2) are stated, as a rule, to follow directly from the linear character of the network.

Those who approach the subject for the first time often find difficulty in appreciating directly the validity of equations (1) and (2), mainly due to the "disembodiment" of the four-terminal network from its closed input and output circuits. In order to avoid this, it must be appreciated that, if by some unspecified internal agency, the voltage at the terminals of a two-terminal circuit element is maintained constant under all external circuit conditions, that element then behaves externally exactly like an *impedanceless* source of e.m.f. equal to its terminal p.d.

This follows directly from Kirchoff's Laws, since the mesh equations for the two-mesh network of fig. 2 (*a*) (in which it is specified that V_1 and V_2 are *maintained* constant) are $I_1(Z_A + Z_C) - I_2Z_C - V_1 = 0$ ..... (3) and $I_2(Z_C + Z_B) - I_1Z_C + V_2 = 0$ ..... (4)

These are also the equations appropriate to the circuit of fig. 2 (*b*) in which Z_1, Z_2 are replaced by impedanceless sources V_1 and V_2. This means that, with the "disembodied" four-terminal network, V_1 and V_2 can be treated as impedanceless sources no matter what internal impedances they may conceal.

Now in any passive linear network, current is proportional to voltage and each impedanceless source may be regarded as producing its own current independently, the total current being the sum of the currents produced by all the sources. Referring to fig. 1, if source V_1 is acting alone (i.e., V_2 maintained at zero), then $I_1 \propto V_1$. Let $I_1 = pV_1$.

Similarly if V_2 acts alone (V_1 maintained at zero) $I_1 \propto V_2$. Let $I_1 = qV_2$ in this condition.

When V_1 and V_2 are present together we must then have $I_1 = pV_1 + qV_2$ ..... (5)

Similarly for I_2 we may write $I_2 = rV_1 + sV_2$ ..... (6).

The quantities p, q, r and s are, of course, constant complex numbers which are functions of the impedances forming the network. Equations (5) and (6) can now be put into the standard form involving the linear parameters A, B, C, D as follows :—

From (6) $V_1 = -\frac{s}{r} \cdot V_2 + \frac{1}{r} \cdot I_2$ ..... (7)

$\therefore$ from (5) $I_1 = p(\frac{1}{r} \cdot I_2 - \frac{s}{r} \cdot V_2) + qV_2 = (q - \frac{ps}{r})V_2 + \frac{p}{r} \cdot I_2$ .. (8).

Let $-\frac{s}{r} = A$ and $\frac{1}{r} = B$; also let $(q - \frac{ps}{r}) = C$ and $\frac{p}{r} = D$, we then have the standard form : $V_1 = AV_2 + BI_2$ and $I_1 = CV_2 + DI_2$.

The constants A, B, C and D are not independent but are related by the equation $AD - BC = 1$ ..... (9).

This follows from the reciprocity theorem which may be stated as follows. If an e.m.f. located at one point in a circuit produces a current at any other point in the circuit, the same e.m.f. acting at the second point would produce the same current at the first point.

The general proof of this theorem is most readily given in determinant form, but its validity may be demonstrated for, say, a three-mesh network, such as a Wheatstone bridge (in the unbalanced condition) by transferring the e.m.f. from the source to the detector. The question of signs must be carefully watched. It is implicit that if the e.m.f. acts in the conventional positive direction of current flow in the original mesh it must also act in the positive direction in the mesh to which it is transferred.

We may conveniently apply the reciprocity theorem to the four-terminal network as follows : (1) Apply a voltage V

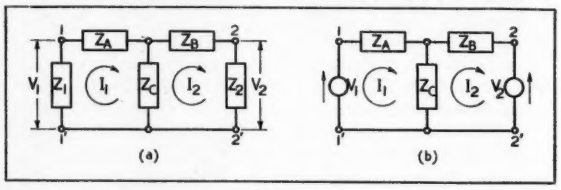


Fig. 2.

to the input terminals with the output terminals short circuited. Calculate the output current in terms of V, A, B, C and D. (2) Apply the same voltage to the output terminals with the input terminals short circuited. Calculate the current flowing between the short circuited input terminals again in terms of V, A, B, C and D.

By the reciprocity theorem these currents must be identical. From this condition the relations between A, B, C and D can be determined : Let $V_2 = 0$; apply V_1 ; then $V_1 = BI_2$ and $I_1 = DI_2$. Distinguishing these values by a dash : $V'_1 = BI'_2$ .... (10) and $I'_1 = DI'_2$ .... (11).

Now apply V_2 at the output with $V_1 = 0$. Distinguishing these values by double dashes we have : $0 = AV''_2 + BI''_2$ ..... (12) and $I''_1 = CV''_2 + DI''_2$ ..... (13).

In order to apply the reciprocity theorem put $V''_2 = -V'_1$ since the e.m.f. must be applied in the same direction relative to the conventional direction of *current* flow.

From (13) $I''_1 = -CV'_1 + DI''_2$ but $I''_2 = \frac{A}{B} \cdot V'_1$ from (12)

$\therefore \quad I''_1 = -CV'_1 + \frac{DA}{B} \cdot V'_1$ ..... (14).

By the reciprocity theorem $I''_1 = I'_2$. From (10) $I'_2 = \frac{1}{B} \cdot V'_1$ $\therefore$ Substituting in (14) $V'_1 = -BCV'_1 + DAV'_1$ or

$AD - BC = 1$ ..... (15).

It should be noted that while A, B, C and D may be complicated functions of the actual network impedance they represent simply measurable physical quantities. For example, with the output terminals short circuited $V_1 = BI_2$ and $I_1 = DI_2$, so that D represents the ratio of input to output current under this condition and B represents $\frac{\text{input volts}}{\text{output current}}$.

With the output open circuited $I_2 = 0$, $I_1 = CV_2$ and $V_1 = AV_2$ so that C is the ratio of input current to output volts in this condition and $A = \frac{\text{Input volts}}{\text{Output volts}}$. In general A, B, C and D are, of course, complex quantities.

FACTORY LIGHTING

Notes on the Fifth Report of the Departmental Committee

By "Lighter"

WITH the approach of winter, consideration of the Fifth Report of the Departmental Committee on Lighting in Factories is of topical interest. This report puts forward certain recommendations which it is expected may at any time become a part of the law relating to factory conditions. The main recommendations are summarised below.

(1) Over the interior parts in which persons are regularly employed, the illumination measured in a horizontal plane 3 ft. from the floor shall be not less than 6 ft.-candles without prejudice to any additional illumination required by the nature of the work.

(2) Over other interior parts over which persons employed are liable to pass the illumination at floor level shall not be less than 0.5 ft.-candle. (In respect of exterior employment, passage and access, attention is drawn to the permissible minimum street lighting standard of 0.0002 ft.-candle set out in BS/ARP 37 and to the possibility of obtaining permission from the local Chief Officer of Police to use higher levels for work of vital importance.)

(3) Throughout the interior parts in which persons are regularly employed, walls, partitions, ceilings, tops of rooms, including interior surfaces of windows and rooflights through which the passage of daylight is continuously prevented, and as far as practicable other structural features, which are less than 20 ft. above floor level, shall be maintained light in colour.

(4) No part of a light source or fitting less than 16 ft. above floor level and having a brightness greater than 10 candles per sq. in. shall be visible to any person while normally employed within 100 ft. of it, unless the angle of elevation from the eye to the source exceeds 20 deg.

(5) Local light sources shall be completely screened by shades of opaque material or other effective means from the eyes of every person employed at a normal working place.

(6) Discomfort or injury by the reflection of light from smooth or polished surfaces into the eyes of the worker shall be prevented as far as reasonably practicable by screening or placing or other effective method.

(7) The formation of shadows which interfere with the safety of, or cause discomfort to, any person employed shall be prevented as far as reasonably practicable.

Comments on Recommendations

It is important to note that the minimum level specified in Recommendation (1) is "without prejudice to any additional illumination," general as well as perhaps local, necessary to make the lighting sufficient and suitable to enable the particular work to be done with ease and to afford reasonable amenity to the workers.

The first Appendix to the Report reprints "Values of the Illumination Recommended for Various Tasks" from the *Transactions* of the Illuminating Engineering Society (London), November, 1938. Many factory engineers would find it interesting to refer to the full schedule issued by this Society or to that contained in the E.L.M.A. Electric Illumination Handbook No. 2.

The second Appendix to the report gives suggestions for attaining an average intensity of 6 ft.-candles. Thus the interpretation of the phrase "shall be not less than 6 ft.-candles" has until recently been problematic. Sir Duncan Wilson, Chairman of the Departmental Committee, recently emphasised that this illumination level is a minimum and not an average level over the working area.

Exception is made to cover circumstances in which structural features prevent the uniform provision of this minimum standard. Nevertheless where actual work is being done the above standards apply, but over the other areas the illumination may be reduced to not less than 2 ft.-candles. Note is made of certain processes where these standards are not applicable, *e.g.*, the manufacture of photographic materials.

In order to obtain any minimum illumination four factors must be allowed for:—(a) Light output of lamp, as published by the lamp manufacturers; for tungsten-filament lamps it should comply with B.S.S. No. 161. (b) Depreciation factor, a reasonable value for which has been agreed by E.L.M.A. and E.L.F.A. as 1.43. (c) Degree of utilisation varying with the size and colour of the space and surroundings; for the majority of factory premises it is not higher than 0.5. (d) Degree of uniformity to be expected with type of reflector and spacing and height ratio; N.P.L. polar curves of two well-known makes of reflector show that, with standard dispersive reflectors and with the normal spacing-height ratio of 1.5 to 1, this is about 60 per cent. (B.S.S. No. 398).

We thus find that 10,000 lumens with standard dispersive reflectors will under normal factory circumstances provide a minimum of 6 ft.-candles over an area of $\frac{10{,}000}{6} \times \frac{0.5}{1.43} \times 60$ sq. ft. = 438 sq. ft. or a space 21 ft. square. If these fittings are mounted at a ratio of 1.25 to 1 the uniformity becomes 70 per cent. and the coverage for 10,000 lumens becomes 480 sq. ft. or about 22 ft. square. The following table gives the coverage of representative electric lamps in standard dispersive reflectors for a minimum illumination level of 6 ft.-candles calculated as above. Coverage for two ft.-candles will be three times the area quoted in the table.

Lamps (Watts)	Lumens Output	Coverage in Sq. Ft. with Spacing-height Ratio of 1.5 to 1
Tungsten filament		
200	2,900	127
300	4,720	225
500	8,470	370
1,000	19,100	830
Plain mercury-vapour		
80	3,040	132
125	5,000	220
250	9,000	390
400	18,000	785
Sodium		
45	2,500	110
60	3,900	170
85	6,100	265
140	10,000	438

Recommendation (2) also gives a minimum figure and the illumination level even in the darkest shadow should not be less than 0.5 ft.-candle. Coverage for this level will be twelve times that quoted in the table.

Recommendation (3) can be of immense value in reducing lighting costs and in creating more comfortable working conditions. I know of several cases of fine detail work where the wearing of light coloured smocks has materially increased output and lessened fatigue.

Prevention of Glare

Recommendations (4), (5) and (6) are designed to prevent a very insidious defect, obstructive glare. It is not clear whether Recommendation (4) is to be interpreted strictly as it is worded and that no part of the source shall be visible, unless the angle of elevation from the eye to the source exceeds 20 deg. I do not know of any make of fitting which complies with this condition where maximum tolerances on manufacture of lamp and lamp-holder occur. It would therefore be interesting not only to factory engineers but also to reflector manufacturers if the Home Office would give a decision on this point.

The high cost of glare may be illustrated as follows:—An object is illuminated to a level of 10 ft.-candles, and a source of glare produces a level of 5 ft.-candles at the eye. Then with the glare source at 40 deg. to line of vision the useful illumination on the object is 6.8 ft.-candles; at 20 deg. it is 4.7, at 10 deg. 3.1 and at 5 deg. it becomes 1.6 ft.-candles, the latter representing a wastage of 84 per cent.

Recommendation 7 refers to an elementary precaution for the provision of safe working and movement. Nevertheless, from my experience of shadows coinciding with the edges of stair treads, or concrete floats or foot boards around machines, and by bins and work placed upon the floor it is very necessary to remind factory executives of the dangers which can be caused to members of the factory staff by shadows and to require their removal.

While the above notes deal with artificial lighting, it must be remembered that the Committee made its recommendations with equal reference to daylight conditions.

Battery Vehicle Costs

A COMPARATIVE table of operating costs for one-ton electric and petrol vans is included in the August *Metropolitan-Vickers Gazette*. Each is assumed to run 30 miles per day for 350 working days per annum. The capital cost of the electric vehicle (including charger but not battery) is £315 and of the petrol vehicle £230, with depreciation (on capital cost less tyres) at 8½ per cent. in the first case and 33⅓ per cent. in the second. Interest for both is taken at 3 per cent. (equivalent to 5 per cent. on the undepreciated balance of capital expenditure). The battery is regarded as "consumable fuel" and replaceable after three years as a conservative figure. On the basis of battery hire purchase the all-in costs with petrol are shown to be about 50 per cent. more than they are with electricity.

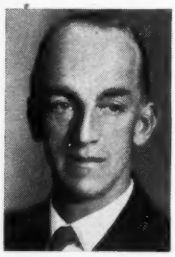
Annual costs are given as follows, those for electric van first: Interest £9 10s., £6; depreciation £23 15s., £67 5s.; battery rental £40 10s., nil; road tax £15, £20; insurance £7 10s., £15; tyre renewals £20 10s., £20 10s.; body maintenance £5 10s., £2 10s.; chassis maintenance £15, £38 10s.; distilled water and lubricants £2 10s., £4 15s.; fuel £18 5s., £57 10s.; totals £158, £232.

PERSONAL AND SOCIAL

Information regarding new appointments and other matters of interest for this page are welcomed

THE Minister of Supply has announced that **Mr. J. C. Budd** and **Mr. W. Mure** havebeen appointed Joint Controllers of Non-Ferrous Metals in succession to Capt. Oliver Lyttleton, who has become President of the Board of Trade. Mr. Budd will give special attention to copper and lead and Mr. Mure to zinc and brass.

Mr. E. S. Riley, deputy borough electrical engineer of Walthamstow, who, as was briefly reported in our last issue, is to succeed Mr. G. R. Spurr on his retirement from the position of borough electrical engineer, is a native of Bradford, Yorks. He obtained his technical education at the Hull Municipal Technical College, gaining honours in electrical and mechanical engineering, and served his apprenticeship in the engineering shops and engine works drawing office of Earle's Shipbuilding and Engineering Co., Hull.



Mr. E. S. Riley

Before going to Walthamstow as general engineering assistant in January, 1914, he had held appointments with the Barrow-in-Furness Electricity Department, Newcastle-upon-Tyne Electric Supply Co., and the Hull Electricity Department. In 1927 he was promoted to the position of chief assistant at Walthamstow, and was designated deputy borough electrical engineer in 1936.

He held a commission in the Royal Field Artillery during the last war, and was on active service in France. He is a member of the Institutions of Electrical and Mechanical Engineers.

Mr. H. R. Beasant, whose chairman's address to the Western Centre of the I.E.E. is abstracted elsewhere in this issue, was born in Cheshire and received his practical training with the Bristol Tramways and Carriage Co., and his theoretical education at the Merchant Venturers' College, Bristol. The whole of his career has been spent with the Bristol Tramways and Carriage Co., with whom he became assistant engineer in 1907. He was appointed assistant engineer, distribution, overhead lines and installations in 1912, and became assistant electrical engineer in 1917. He was promoted to his present position of chief electrical engineer to the company in 1928.

Mr. Beasant was assistant hon. secretary of the Western Centre of the I.E.E. from 1926 to 1930, and hon. secretary from 1930 to 1938. He is a past president of the Bristol Association of Engineers, past chairman of the Bristol Electric Club, and represents the Public Service Transport Association on the Joint Committees on Electrolysis and Overhead Equipment.

Captain H. E. B. Daniell, the new president of the North of England Branch of the Association of Mining Electrical Engineers, is agent to the Stella Coal Co. and son-in-law of Sir Frank Simpson, the company's managing director. Captain Daniell served with the D.L.I. in the last war and retired in 1935. He has had considerable experience in the electrification of collieries, some of the Stella Co.'s pits having been changed over to electricity in recent years.

Mr. R. W. Cairns, who has been installed Master of the Worshipful Company of Plumbers, London, is a well-known heating and electrical engineer of Newcastle-on-Tyne.

Mr. T. P. Easton, manager of Newcastle-on-Tyne City Transport and Electricity Department, is to retire next March. He was originally due to retire last March, but his period of service was extended for another year. A new manager will be appointed at a commencing salary of £1,200.

Hackney Borough Council Electricity Department has appointed **Mr. G. Lee,** A.C.G.I., A.M.I.Struct.E., as technical assistant to the Department. Mr. Lee is lecturer (visiting) in electrical technology and mathematics at the Hackney Technical Institute.

Sec.-Lieut. W. F. Clive, who before joining the Army was with the Yorkshire Electric Power Co., was married recently to Miss Margery Butterfield, of Staincliffe.

Mr. J. McAlpine Owen, who has been appointed manager of the Manchester Telephone Area, has been presented with an oak bureau from the staff of the Peterborough Telephone Area, of which he has been manager since 1936.

Mr. J. W. Dunning, acting manager of the Cardiff Corporation transport undertaking, has been recommended for the position of traffic manager of the Department at a salary of £800 a year. **Mr. W. J. Evans,** who was recently appointed chief engineer, will be responsible for the engineering side. A sub-committee is to define the duties of the two officials. For many years the general manager has had full control. Mr. Dunning was deputy to the late Mr. W. Forbes, upon whose death he was appointed acting manager.

Obituary

Mr. G. H. Nisbett.—As we go to press we learn with great regret of the death, on October 21st, of Mr. George Hinde Nisbett, deputy chairman of British Insulated Cables, Ltd., and chairman or director of a number of other companies. A memoir will appear in our next issue.

Mr. J. B. Mackay.—The death occurred on October 3rd, after a long illness, of Mr. James Black Mackay, who for fifteen years was a special representative of the Vacuum Oil Co., Ltd. Many well-known engineering firms were represented at the funeral, which took place on October 10th.

Mr. Mackay's early apprenticeship was served with the British Westinghouse Electric Manufacturing Co., Ltd., Manchester, where he took the special mechanical engineering course, passing through many departments. Then followed a period with the British Thomson-Houston Co., Ltd., Rugby, by whom he was engaged on the erection of Curtis turbines and auxiliary plant at the County of London Electric Supply Co.'s generating station at Wandsworth. He was then associated with the Allis Chalmers Co. at Milwaukee and Port Washington, Wisconsin, U.S.A., and on his return to England was for a period with the Browne Engineering Co., Ltd. He gained further experience with John Brown & Co., Ltd., and Herbert Morris, Ltd. Before joining the Vacuum Oil Co., Ltd., he was for eight years with the Skefko Ball Bearing Co., Ltd.

Mr. G. B. Richards.—We learn with regret of the death of Mr. George B. Richards at the age of forty-three, due to a motor accident. He joined Higgs Motors in 1926, and for the past three years had held the office of sales director. He travelled twice round the world on the firm's business, and during the last war served with the Royal Engineers.

Mr. W. L. Hichens.—We regret to record the death, which occurred on October 14th in London, by enemy action, of Mr. William Lionel Hichens, chairman of Cammell Laird & Co. He was also on the board of a number of other companies, being deputy chairman of the Metropolitan Cammell Carriage & Wagon Co., and a director of the L.M.S. Railway, English Steel Corporation, and Commonwealth Trust Co. He was elected chairman of the English Electric Co., Ltd., in 1927 and resigned from the board on the completion of the reconstruction of the company in 1930.

Mr. R. C. Soans.—The death is announced of Mr. Raymond Campion Soans, one of the founders of Barnett & Soans, Ltd., electrical engineers, which occurred on October 5th at Exeter. Mr. Soans retired from the firm three or four years ago. He leaves a son, Mr. J. R. Soans, who is also connected with the business, and a daughter.

Miss M. Rees.—We regret to record the death, on October 7th, of Miss M. Rees, who was killed in an air-raid. Miss Rees had been employed by the Hotpoint Electric Appliance Co., Ltd., since October, 1922, and for fifteen years was the senior cookery demonstrator. She was a member of the Electrical Association for Women.

Dr. C. H. Merz

IT is with very deep regret that we record the death, which occurred on October 15th, of Dr. Charles Hesterman Merz, senior partner in the firm of Merz and McLellan, consulting engineers. Dr. C. H. Merz, who was the son of the late Dr. J. T. Merz, was born at Gateshead-on-Tyne in 1874 and received his engineering training at Armstrong College. His chief professional activities were in connection with the design and execution of electric power and traction schemes in various parts of the world.

In Great Britain the area of the North-Eastern Electric Supply Co. afforded him scope to initiate developments on a large scale, which later provided the basis of the national grid and which included many features at that time of a novel character, e.g., centralised system control. In connection with these schemes he designed a series of large power stations over a number of years from Carville A to Dunston B which led the way towards high thermal efficiencies.

Other outstanding work in this country was carried out on behalf of the County of London Electric Supply Co. and its associated concerns, which called for the construction of Barking and Littlebrook power stations. He was also retained in an advisory capacity by the Commonwealth Edison Co., of Chicago, and by many public bodies at home and in the Dominions, among which were the Central Electricity Board and the Electricity Commissions of Victoria and of South Africa.

Abroad he was responsible for large railway electrification schemes, including the conversion of the South African Railways and the Great Indian Peninsula Railway, and he compiled a technical report for the Weir Committee which investigated the question of main-line electrification in Great Britain. He presented papers on this subject and on electricity supply matters before the I.E.E., the British Association and other institutions.

The late Dr. C. H. Merz

During the last war Dr. Merz was Director of Experiment and Research at the Admiralty, and within the same period served on the Haldane and Williamson Committees, which laid down the general principles on which modern electricity supply developments are based. He was a vice-president of the Institution of Electrical Engineers from 1912 to 1915 and was awarded the Faraday Medal in 1931. In the following year he received an honorary D.Sc. degree from Durham University.

RELATIONS WITH WHOLESALERS

Separating the True from the False

By a Manufacturer's Representative

THE excellent article contributed by Mr. J. Whitehead to ELECTRICAL REVIEW of September 20th under the title "The Manufacturer's Representative" has prompted me to venture into print by way of reply.

I have had the good fortune and pleasure of being "A Manufacturer's Representative" for three leading firms in the electrical industry; my experiences are spread over a period of ten years and my territory covers an area which includes six counties. It is humbly suggested, therefore, that the following notes may be of some small service to the various associations who endeavour to direct business through "legitimate" channels.

According to the Shorter Oxford English Dictionary a "wholesaler" is "one who buys in large quantities, in a large way, in large numbers or amount, in abundance." By the same authority the word "factor" means "one who buys or sells for another; a commission merchant." The factor seems to have become confused with the wholesaler, who has an entirely different function.

Suggested Classification

In the electrical industry there appears to be no fewer than six, probably more, classes of wholesalers and these may be grouped as follows:—*Class A.*—Old-established firms enjoying a national reputation; *Class B.*—Well-established firms of more localised reputation; *Class C.*—Well-established builders' merchants who possess electrical departments; *Class D.*—Small firms who cater for a very limited locality; *Class E.*—Hardware merchants and ironmongers who claim wholesale terms; and *Class F.*—Contractors who open wholesale departments under a *nom de plume*.

It will be seen, then, that the activities and methods of a manufacturer's representative must be sufficiently elastic to deal with widely different types of wholesale business, and a few notes on each of the categories mentioned may be of service.

The number of CLASS A firms is very small. They produce periodically very comprehensive catalogues which undoubtedly serve as first-class books of reference to all types of contractors, engineers and industrial users and they are wholesalers in the fullest possible sense. Their activities, however, tend to cause them to negotiate, where possible, very heavy trading discounts with their suppliers. In some cases it would appear doubtful whether business of this nature can be regarded as worth handling by the manufacturer as the remaining margin of his profit is more and more absorbed by discounts and trading expenses. The practice of linking up a catalogue number with a code form of "trade price" exposes confidential information to any person with the most elementary business knowledge. It is suggested that this custom should cease and that catalogues should give list prices only, discounts, etc., always being shown on a detachable leaf or quoted in correspondence.

Firms in CLASS B do not usually produce a catalogue of the products which they market but can usually be relied upon to place substantial orders for standard goods. They maintain their own outside representatives who form a useful connection with small traders in remote districts and villages which the manufacturer's representative cannot cover. It is usually found also that although they possess substantial premises in a good position, no attempt is made to handle any retail business.

Builders' Merchants

CLASS C represent a most interesting and controversial problem. During the past few years, quite a number of builders' merchants have opened electrical departments with greater or less success. In my view, this depends entirely on the experience and knowledge of the manager and the buyer who are in control. This does not necessarily imply a lengthy experience in the building trade but a good general knowledge of the complex subject of discounts, stock control, and general business keenness.

The builders' merchants possess a unique advantage over the purely electrical wholesaler. They receive inquiries for material for specific contracts long before the electrical trade in general is approached, and are consequently in a position to approach architects and others at a very early stage in any contract. Some possess extensive showrooms and are thus able to put before their clients a range of manufacturers' products in great profusion. They also solve the very tricky problem of deciding what terms should be given to builders who purchase electrical accessories, etc. In my opinion, the builders' merchant may prove to be an excellent outlet in the future for the "de luxe" or "streamlined" cooker, which no doubt will gradually supersede the existing imitation gas stoves so widely distributed by our friends the supply authorities. If this is to be a success the question of discounts will have to be completely revised as the existing terms are inequitable and unremunerative. This class of business undoubtedly will have vast possibilities during the period of post-war reconstruction and this large potential market for electrical products should not be overlooked. These people come into contact with everyone who is contemplating a new home and this is where their electrical education naturally begins.

Nearly all CLASS D firms started in a small way, but this is hardly possible in the case of a wholesaler. Several "mushroom" wholesalers have sprung into existence in the past few years but the present crisis has caused them to conclude their activities. I consider that the trade is already well provided with wholesale distributors and the small wholesaler is a dangerous source of supply for the backyard contractor who cannot obtain trade terms from legitimate sources. It would be interesting to know the average value of each order which they handle, as their sole service to the industry appears to be to enable the aforementioned fraternity to live from hand to mouth, and thus avoid the carrying of any stocks whatsoever. This, in turn, results in cut-price wiring which is a serious menace to the contracting branch of our industry.

CLASS E firms present a very difficult problem to a representative. In the first place they are usually well-established retailers and presumably should only be entitled to retailers' discounts. They usually claim, however, that they sell to "the trade" and are therefore entitled to preferential terms. But the value of orders that they place is not large and the material is obviously required for retail sales. The representative is then told: "If you do not give us preferential terms, your competitor will." This state of affairs is wrong, but the representative is faced with the problem of securing the business with the result that he usually gives way. A suggestion for solving this problem is given later in this article.

Too Many Wholesalers

Apologies are tendered for including CLASS F, but the members of this category are slowly but steadily increasing and it is time to call a halt to a practice which is against the ethics of the industry. The writer has been approached by established firms of good repute who even go to the trouble of printing suitable order forms, etc., to prove that they are "wholesalers." This would be understandable if they made some attempt to act as wholesalers or, alternatively, bought "in large quantities, in gross, in a large way, etc." Their purchases, however, are obviously for their retail business and their "Wholesale Department" is usually their workshop or stores address nearby. In these days of severe competition it is extremely difficult to deal with cases of this nature and I suggest that strong action is needed by the Electrical Contractors' Association to stamp out this form of trading.

Of recent years the number of wholesalers seems to have expanded far beyond actual trade requirements, and although the Electrical Wholesalers' Federation appears to control its own members this does not curb the activities of those outside the Federation. It is difficult to put forward a constructive suggestion to remedy this as the E.W.F. does not fully cover the wholesale trade although it is to be hoped that it will eventually do so. When this position is reached the wholesalers, as a body, could arrange a definite sliding scale of terms based on the annual turnover of each classification referred to above. This would be the only method of ensuring that wholesale discounts bore some relation to the volume of business handled and would curtail the activities of some of the people mentioned above. No doubt the manufacturers would heartily welcome an arrangement of this nature and give the scheme their full support to ensure its proper working.

Mr. Whitehead's suggestions regarding the co-operation of the manufacturer's representative with the wholesaler's representative are interesting and useful, but the former has other sections of the trade to cater for and if he is to spend several days per week with one wholesaler then obviously his turnover is going to suffer. It is agreed that in some types of business the services of a "specialist" are necessary, such as large commercial lighting inquiries, space heating, washing machines and washing-up machines, to mention only a few. In these instances, the manufacturer is only too pleased to provide the services of a suitable engineer or speciality salesman. If this service is

(*Concluded at foot of next page.*)

COMMERCIAL and INDUSTRIAL NEWS

Insurance of Exports. Factory Lighting Regulations. N.A.R.R. Annual Meeting

Consideration for Newsagents

VARIOUS circumstances are likely to arise nowadays to prevent readers from getting their ELECTRICAL REVIEW as promptly as they do in normal times. This is very annoying, of course, but beyond the control of our Publishing Department or the newsagents. We therefore appeal to readers not to refuse to accept the REVIEW if it is a day or so late, for under wartime arrangements returns cannot be accepted and consequently the newsagents suffer hardship if papers are ordered and not taken.

Protection for Exporters

The facilities provided by the Export Credits Guarantee Department, which protects exporters against the risks of giving credit to overseas customers, have recently been extended. Exporters who wish to quote a c.i.f. price can now cover the risk of increases in war risk insurance, marine insurance and freight rates. In addition, a new all-in war emergency policy has been introduced to meet the convenience of exporters who desire cover from the time of booking an order against pre-shipment, solvency and transfer risks, including the risk of loss due to diversion or frustration of shipment.

The Department's booklet, "Exporters' Risks in War Time," has been revised to include information regarding these new policies, and copies can be obtained from the Department's head office at 9, Clement's Lane, London, E.C.4, or from any of its district offices at Manchester, Bradford, Birmingham, Sheffield, Newcastle-upon-Tyne, Glasgow and Belfast.

E.D.A. Charts

The British Electrical Development Association is issuing three charts intended mainly for use at food and cookery demonstrations. These can, however, be quite usefully employed as posters in showrooms and on poster sites. They measure 30 in. by 20 in. and deal with (1) body building foods, (2) energy foods and (3) protective foods. Each chart is printed in its correct colour as laid down by the Ministry of Food, the body-building foods being blue, energy foods in red and protective foods in battleship grey. The Ministry attaches great importance to establishing these colours clearly in the mind of the nation as part of a long-term nutrition and dietetic campaign.

In addition to cataloguing and illustrating the various foods, together with a pertinent statement regarding their special characteristics, three simple symbols have been incorporated. The symbols on the chart for body-building foods show the seven ages of man; a locomotive is the symbol for the energy foods chart, and a knight in armour for the protective foods chart. The special value of these charts lies in their simplicity and designedly elementary presentation. Demonstrators using them should be able to give at least a five-minute talk with each chart, and they should prove a valuable contribution to the Right Food Campaign. Copies can be obtained from the Association at 3/- per set.

Relations with Wholesalers

(*Concluded from previous page*)

utilised, however, some adjustment should be made in the normal terms allowed, to off-set the time and expenses of the engineer or salesman concerned.

The calling of two representatives on the average contractor, except by invitation, is not usually welcomed. This is only natural as the prospective buyer immediately feels at a disadvantage and would prefer to limit the discussion to himself and the representative with whom he is familiar.

I consider that the successful wholesaler's business is based on:—(1) Adequate stocks of standard lines coupled with a limited quantity of "competitive" material. (2) Good showrooms with *experienced* staff, male or female. The manager or buyer should not regard himself as too important to spend some time in his showrooms. (3) Intelligent and keen attention to 'phone inquiries and orders. Far too much business is lost through slackness in this respect. (4) A rapid delivery service and willingness to oblige the customer.

These notes are naturally of a controversial nature, but it is hoped that they may be of some small service to those responsible for the conduct of an industry which we all desire should never cease in the search for efficiency and order.

Motor Manufacture in Canada

Small Electric Motors, Ltd., of Beckenham, England, through its Canadian subsidiary, Small Electric Motors (Canada), Ltd., has completed plans to take up a 1½-acre factory site on Vanderhoof Avenue, Leaside, near Toronto, for the immediate erection of a Canadian factory, according to an announcement by the Toronto Industrial Commission. A single-storey factory is to be erected and initial employment will be given to seventy persons when manufacturing operations get under way. The lines to be produced have not been disclosed.

Tractor for Gasworks

An electric tractor with motors which have been in use for something like 35 years has been scrapped by the Southport Gas Committee. Sir Ernest Hadfield explained at a recent meeting of the Town Council that the tractor was worn out and was past repairing. Tenders had been received for electric and steam tractors and the Committee decided, by a majority, in favour of a steam engine. The price of an electric tractor would be £3,190 and a steam one would cost £1,885. In addition to the increased cost of the electric tractor a sum of £400 would have to be spent during the next two or three years on repairs to the wiring system. Councillor Wilkinson considered that a steam locomotive would be an abomination in a place like Southport. Also there was no promise of delivery under eight or nine months, and it was more probable that it would be twelve. Councillor Barker, who is in the electrical business, thought electrical machinery was probably the most difficult of all to obtain at the present time. Upon the matter being put to the vote it was decided by 23 votes to 21 to buy a steam locomotive.

Unlocking Shelter Doors

The Ministry of Home Security has refused to sanction the installation of remote control device to unlock doors of all public air-raid shelters in Scunthorpe by pressing a button in the A.R.P. control room. The scheme would have cost the town about £1,000.

Eyesight and Efficiency

A few years ago the Eyesight Conservation Council of America published a report on eyesight in industry. One of its features was a table in which various occupations were put into groups according to the percentage of poor sighted workers found in each occupation. It was found that among electrical workers 40 per cent. suffered from uncorrected eyesight faults. From various small-scale eyesight surveys made in this country the conclusion was reached that the percentage of eye sufferers was the same. Furthermore it was found that the percentage rose in relation to the age of the worker, and in relation to his particular job. The number of poor sighted workers is usually found to be greater among those whose job entails long spells of concentrated eye work at close range. The human eye is not adapted to close work, even under the best conditions, and if the illumination of close range work is inadequate, the mechanism of vision suffers.

The scientific study of lighting has reached a plane hitherto unknown, but there still remains a point which is constantly overlooked. Better lighting conditions may improve, but can never perfect the efficiency of defective-sighted workers. Therefore attention to the vision of employees is a necessary complement to re-designing lighting systems.

It is not difficult to devise a series of visual tests which will ascertain whether or not eyes will be helped by glasses. There is in fact an instrument designed for this specific purpose, viz.: the "Stereosette." Many large industrial undertakings have already organised a test of their employees' eyesight by this method with good results. The Institute of Ophthalmic Opticians, 7, Park Lane, London, W.1, has been engaged in investigating the eyesight conditions in every industry for some time. The Institute informs us that it would be glad to arrange a visual survey of the employees of any firm engaged in the electrical trade, free of charge.

Limitation of Supplies

The Director of the Electrical Wholesalers' Federation informs us that he has obtained further rulings regarding electrical equipment under the Limitation of Supplies (Miscellaneous) Order. The following types of shade are regarded as controlled goods:—Green cased bell, white opal conical, satin finish bell, green and white opal conical, and moulded shapes (bell and conical). Although shades with 1½-in. holes are particularly specified, the Director says that it is obvious that the ruling also applies to shades with 2¾-in or 3¼-in. flanges. The following goods will not be controlled:—Opal "Coolicon" shades, shop signs—A.R.P. type ("Open," etc.), and all other A.R.P. signs.

Radio Retailers

Speaking at the recent annual meeting of the National Association of Radio Retailers, the president (Mr. C. R. Spouge) said that while many radio traders were experiencing bad times, in general radio had come into its own and was now regarded as almost a necessity. There had been a number of resignations, but actually there was a net increase in the membership. It was the radio retailers' job to provide as efficient a service as possible and the Association had instituted a technical service which had assisted many members with their difficulties. Also, to compensate for the loss of service engineers who had joined the Forces, an intensive correspondence course had been arranged to improve the usefulness of men with some knowledge of service work.

The Association had also been active in watching the interests of radio retailers in connection with the Prices of Goods Act and the Purchase Tax. With regard to hire-purchase, although the rates were increased by finance houses negotiations had resulted in a smaller increase than was first proposed. There were now two schemes for the use of members; one incorporated the insurance pool and the other included a cash rebate. Members must consider whether or not to continue hire-purchase, but it seemed that if proper safeguards were taken suitable agreements were quite a fair risk.

Lift Maintenance

Almost eight years ago what was believed to be the first lift maintenance manual intended for general public use was published by Marryat & Scott, Ltd., 75, Clerkenwell Road, London, E.C.1. From the same source has now come an 80-page handbook, of convenient pocket size, priced at 10s. 6d., which deals with the same subject but from a fresh aspect.

Since maintenance cannot be attempted without acquaintance with the governing principles underlying design and operation, the author of the new booklet (Mr. L. J. Gooch) first briefly describes an electric

lift in general terms before proceeding to trace historically the development of control gear in such a way as should enable the basic elements of regulated actuation to be assimilated without more than quite elementary electrical knowledge. Twenty-three illustrations and diagrams help to explain circuits, from the simplest form of handrope control to attendant-operated and automatic systems.

In the second half of the booklet, which is devoted to maintenance, the "safety first" principle is evident; so that if the instructions given are followed anyone not versed in lift practice should be able to give a lift ordinary attention without harming himself or the equipment.

Shelter Fatalities

An inquest was held recently on Michael Maher, aged thirty-eight, of Tottenham, who received a fatal electric shock in an Anderson shelter. It was stated that he was doing repair work in the shelter and when he switched on the electric light he fell dead with the flex in his hand. The owner of the shelter said he bought the switch a year or two ago for 4d. or 6d., and had used it nightly for the past three months. Evidence was given given by a Home Office inspector that the switch blades were displaced and at any moment might come into contact with the metal, so causing a short-circuit.

Another case of fatal shock in connection with the electricity supply to an air-raid shelter was the subject of an inquest held at Bootle. The victim in this instance was a child aged two who was killed through grasping a cable carrying electricity for lighting the shelter. The father and another man were installing lighting, and the child, who was not wearing shoes or stockings, was found holding the lampholder and cable. It was raining at the time.

Batteries for Electric Vehicles

Hull Corporation Cleansing Committee is to purchase four batteries at a cost of £185 each for electric vehicles.

Purchase Tax on Water Heaters

The Electric Water Heater Manufacturers' Association has been in communication with the Valuation Branch of the Customs and Excise regarding the sizes of electric water heaters which are to be subject to Purchase Tax. It has now been agreed that thermal storage heaters which have a capacity of not more than 30 gallons will be subject to the tax. The normal loading of heaters of 30 gallons capacity is 3 kW, and it has therefore been agreed that the corresponding sizes of immersion heaters and circulators which are subject to tax are those which have a loading of not more than 3 kW.

The Purchase Tax applicable to both types of heaters is one-third of their wholesale values. The wholesale values of the heaters have been agreed with the Valuation Branch, and are such that for thermal storage heaters the tax is equivalent to 22½ per cent. of the manufacturers' current list price, and for immersion heaters and circulators 20 per cent.

Bridge Lighting in India

The lighting installation on Jamalpur Bridge, Ahmedabad, reminds us that even if exterior lighting is temporarily at a standstill in this country, the latest principles are still being applied with success in the more peaceful parts of the world. Ahmedabad, which lies on the bank of the River Sabamati, is the principal district and headquarters of Gujerat, the northern division of the Bombay Province. Jamalpur Bridge, which has only recently been completed, has a carriageway 4,100 ft. long, the overall length with the approaches being approximately 7,000ft. The road is 32ft. wide between kerbs on the bridge itself and 8ft. wider on the approaches. In view of these characteristics the lighting on the bridge was treated as a street lighting problem and directional "Difractor" lanterns mounted at 25ft. on steel columns were installed. A staggered arrangement of units with 250-W Osira high-pressure mercury-vapour lamps, 140ft. apart, was chosen for the entire length of the bridge and approaches. As may be judged from the accompanying illustration, the illumination gives excellent results.

G.E.C. lighting at Jamalpur Bridge, Ahmedabad

The lamps and auxiliary gear were supplied by the General Electric Co., Ltd. The lighting cables for this scheme were by Callender's Cable & Construction Co., Ltd., and the installation work was carried out under the supervision of the engineer-in-charge of Callender's Ahmedabad office. The standards are of local manufacture.

Changes of Address

J. M. Webber & Co., Ltd., have moved their main stores and general offices to Weblite Works, Prince Street, Earls Barton, Northants. Their London trade counter in Great Eastern Street remains open.

Browning's Electric Co., Ltd., has removed to Boleyn Castle, Green Street, Upton Park, London, E.13. The telephone numbers remain unchanged.

The Enfield Cable Works, Ltd., has removed its London office to Victoria House, Southampton Row, London, W.C.1 (telephone: Holborn 8934).

Birmingham Civic Centre Equipment

For the new civic centre buildings, Birmingham Corporation General Purposes Committee is to provide electric light fittings at a cost of £1,300, an internal automatic telephone system costing £4,000, and electric clock dials £300.

The Sun Electrical Co.

We are informed by the Sun Electrical Co., Ltd., that in spite of wartime difficulties business is being carried on without serious delay. The trade counter is still operating with its usual efficiency.

New Catalogues and Lists

Ultro Heat, Ltd., Mosley Chambers, Great Underbank, Stockport.—Leaflet descriptive of steel hot-water radiators, electrically heated.

Barries Electrical Agencies, Gladstone Crescent, Hove, 4.—Illustrated price list (No. 25840) of torpedo switches, through type.

Factory Lighting Regulations

THE Ministry of Labour and National Service has decided to adopt a number of the recommendations made by the Departmental Committee on Lighting in Factories and has prepared a draft Order to give them effect. The Regulations will apply to factories in which persons are being regularly employed for more than 48 hours a week, or in shifts, unless the provision of a specified standard of lighting is impracticable under any defence requirement. Any objection or representation in respect to the Regulations must be sent within 40 days of October 15th to the Secretary, Ministry of Labour and National Service, Cleland House, Page Street, London, S.W., and should state the specific grounds of objection and the omissions, additions or modifications asked for. Copies of the draft Order (1d. net) and an accompanying explanatory memorandum can be obtained from the Stationery Office.

Draft Regulation 2*a* provides that general interior illumination where persons are regularly employed shall be not less than 6 ft.-candles at a horizontal plane 3 ft. above floor level. Where the mounting height of the light sources is necessarily over 25 ft. from floor level or where the structure of the room prevents the attainment of the standard, the general illumination is to be not less than 2 ft.-candles, with not less than 6 ft.-candles at the working place or the greatest reasonably practicable illumination below 6 ft.-candles. In other interior parts the floor-level illumination must not be less than 0.5 ft.-candle (2*b*).

Where the light source is less than 16 ft. above floor level no part of the source having a brightness greater than 10 candles per sq. in. shall be visible to persons normally employed within 100 ft. of the source except where the angle from the eye to the source exceeds 20 deg. Glare from local lighting and from polished surfaces is to be avoided and measures must be taken to prevent shadows which willcause eye strain or risk of accident.

The Chief Inspector of Factories may exempt factories or parts of them from any requirements of the Regulations if he is satisfied that compliance is inappropriate or not reasonably practicable. There is a general exemption from Regulation 2*a* for certain works including electrical stations.

The Explanatory Memorandum contains a great deal of guidance for factory owners and we propose to say more about it in our next issue. Advice on electric lighting of factories can be obtained from the Secretary, Joint Electric Lighting Committee, 2, Savoy Hill, W.C.2.

Trade Mark Applications

AMONG recent applications for British trade marks are the following, objections against any of which may be entered within one month from October 9th :—

Kite, No. 612662; **Swan,** No. 612663; **Whale,** No. 612664. All Class 2 (IV). Materials composed principally of synthetic resin and sold in the form of sheets, rods, tubes or blocks. Ellison Insulations, Ltd., Wellhead Lane Works, Perry Barr, Birmingham.

Autorac, No. 612711, Class 9 (IV). Electric battery charging apparatus and instruments. Crypton Equipment, Ltd., St. Mary's Street, Bridgwater, Somerset.

Information Department

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following :—

H.D. (or D.H.) Sw. Gear Co.

ELECTRICITY SUPPLY

Kirkcudbright Mutual Assistance. Domestic Supply Problem at Richmond

Bacup.—MAINS AND SERVICES.—Application is being made by the Town Council for permission to borrow £2,000 for unspecified mains and services.

Barrow-in-Furness.—OVERHEAD LINES.—The Corporation Electricity Committee has obtained sanction for the erection of overhead lines.

WORKS FEEDERS.—The Committee is to extend feeders at a cost of £3,770.

IRONWORKS BULK SUPPLY.—The existing bulk supply at the North Ironworks substation is to be extended at a cost of £419 for switchgear in connection with the installation of 1,000 HP of electrical plant in the old paper works at Ulverston.

QUARRY SUPPLY.—Electrical plant of from 400 to 500 HP is to be installed at the Stainton Quarries, and the Corporation Electricity Committee is to provide an overhead line, transformer and switchgear at a cost of £1,406.

Bedford.—LOANS SANCTIONED.—The Electricity Committee has obtained sanction to borrow £306 for meter testing equipment and £1,360 for mains.

Bradford.—LOAN APPLICATION.—The Corporation Electricity Committee is seeking sanction to borrow £3,087 for additions to the Bolton Road premises and £7,897 for power station switchgear modifications.

Burton-on-Trent.—UNIT HEATERS.—The Works Committee proposes to heat the Belvedere House corridors by means of electrical unit hot air distributors.

Carlisle.—SUPPLY TO BRICKWORKS.—The Electricity Committee is to provide a supply to the Kirkhouse Brick & Tile Works at a cost of £732. It is also to replace a section of overhead line by an underground cable.

POWER STATION EXTENSIONS.—Sanction has been obtained to the borrowing of £709,000 for power station extensions.

Cheltenham.—COOKER WIRING.—At a recent meeting of the Electricity Committee it was reported that the cooker wiring contractors had asked for a revision of the present terms (10s. plus 6d. per ft. for a maximum of 30 ft.) and had agreed to a revised charge of 8s. plus 9d. per ft., with a minimum allowance of 24 ft. free.

Colne.—MAINS AND SERVICES.—Application is being made by the Electricity Committee for permission to borrow £3,624 for mains and services.

Doncaster. — STREET LIGHTING. — The R.D.C. has agreed to the installation of modified street lighting at Rossington, Edlington and Armthorpe on terms arranged by the respective Councils.

Dumfries.—NEW SWITCHGEAR.—Alterations and additions to main switchgear are proposed, at an estimated cost of £750, in consequence of an additional feed being made available from the Central Electricity Board. The Corporation Electricity Committee is also to erect a substation at a cost of £220.

NO CHANGE IN TARIFFS.—After hearing the engineer and manager's report for the year the Committee has recommended that no change shall be made in tariffs for the ensuing year.

Houghton-le-Spring.—LIGHTING SCHOOL SHELTERS.—The Education Committee has decided to ask the Durham County Education Committee to install electric lighting in school shelters wherever possible.

Hull.—PLANT REPAIRS.—The Electricity Committee has voted £1,500 for repairs consequent upon the breakdown of boiler and turbine plant at the power station.

Kirkcudbrightshire.—MUTUAL ASSISTANCE PLANS.—Originally proposals were considered by the Electricity Committee for a mutual assistance scheme with the electricity authorities for Dumfries County, Dumfries Burgh and Wigtownshire, and the Galloway Water Power Co. Subsequently, however, the matter was taken up by E.D.A. (Scottish Area) from a national viewpoint, and the Association submitted a mutual assistance scheme under which the Kirkcudbrightshire Electricity Department was included in a group consisting of the following undertakings:—Ayrshire Electricity Board, Dumfries County Council, Dumfries Town Council and Wigtownshire County Council. These arrangements were approved by the Kirkcudbright County Council at its last meeting.

COOKER SALES.—The convener of the Electricity Committee reported to the County Council that in the first quarter of the current financial year 142,000 kWh more had been sold than in the corresponding period last year, and the revenue had increased by £1,192. They continued to sell a considerable number of cookers and were still able to get a supply.

Liverpool.—SUBSTATION PLANT.—The Corporation proposes to borrow the sum of £11,000 for substation plant and equipment.

Loughborough.—SHELTER LIGHTING CONCESSION.—The Council has adopted the electrical engineer's suggestion that owners of shelters taking electricity on the flat rate should be allowed to connect any shelter lighting installation to the domestic power circuit, provided the shelter lighting does not exceed 25 W and that an additional 2s. 6d. a quarter is paid.

Middlesbrough. — SHELTER LIGHTING.—The Town Council is to install electric lighting in 23 air-raid shelters.

Motherwell.—CONTROL SYSTEM.—The Town Council at its last meeting approved proposals by the electrical engineer for the operation in the burgh of a system of "Rhythmatic" control of air-raid warnings. The estimated cost is £2,000.

Nelson. — ELECTRICITY PROFIT. — The Corporation accounts show that the electricity undertaking made a net profit of £4,374 last year.

Oxford. — CABLE-LAYING. — The Town Council has granted an application of the Wessex Electricity Co. to lay an 11-kV cable and low-voltage cables.

Peterborough.—LOAN FOR SUBSTATIONS.—Sanction has been obtained by the Corporation to the borrowing of £3,050 for substations.

Plymouth.—NEW TRANSMISSION LINE.—The Electricity Committee has obtained sanction to borrow £1,091 for an additional main transmission line for increasing a bulk supply.

CERTIFICATION OF METERS.—In order to release further employees of the Electricity Department for war work, the Electricity Commissioners were recently asked if they would waive their requirements in respect of the certification of meters installed since July, 1933. They have intimated, however, that they are not prepared to take steps to secure an amendment of the existing law to this effect.

Richmond (Yorks). — DOMESTIC LOAD PROBLEM.—The borough electrical engineer recently reported to the Electricity Committee that he was concerned about the loading of a substation supplying part of the town. As it was impossible to obtain a larger transformer for domestic supplies at present, consumers might have to be asked to refrain from using additional electrical appliances and to exercise economy in the consumption of electricity. Tests are being carried out by the engineer and consideration of the Committee's report has been deferred meanwhile by the Town Council.

Sheffield.—DISTRIBUTION WORKS.—The Electricity Committee is to extend mains at a cost of £5,343, and has purchased a site for a substation.

INSTALLATION AT INSTITUTION.—The Health Committee has arranged for the Electricity Department to install electricity at the Hollows Meadows Institution at a cost of £352.

Skelton (Yorks).—ELECTRICITY FOR PRIVATE SHELTERS.—The Urban District Council is to install electricity in private shelters.

Swansea.—HIGH-VOLTAGE CABLES.—The Electricity Committee is to provide additional e.h.v. mains to the Blackpill and Mumbles area at a cost of £13,000, and an additional e.h.v. main and substation (£4,927).

Wallasey.—PURCHASE OF WATER-HEATERS.—A sum of £600 from surplus revenue is to be utilised by the Electricity Committee for the purchase of water-heaters.

West Hartlepool.—LOAN FOR WIRING.—The Town Council is to apply to the Electricity Commissioners for sanction to borrow £1,000 for wiring on consumers' premises.

Worksop.—ELECTRICITY FOR COTTAGES.—The Town Council is recommended to provide electricity at cottages at Bracebridge and Clumber Sawmills.

York—PURCHASE OF EQUIPMENT.—The City Electricity Committee recommends that the sum of £4,000, required by the Department for consumers' electrical apparatus, and £2,200 for the purchase of a mobile grab, shall be met out of revenue.

TRANSPORT

Brazil.—RAILWAY ELECTRIFICATION CONTRACT.—It is reported in *The Times* that the contract for the electrification of the Sorocabana Railway was signed on October 12th. It is being financed through the Export-Import Bank of Washington, the sum involved being roughly £2,375,000. The American General Electric and Westinghouse Companies are sharing in the contract.

Cardiff.—PROPOSED NEW TROLLEY-BUS ROUTE.—The Corporation is seeking consent to run trolley-buses along Muirton Road, Tremorfa.

Newcastle-upon-Tyne. — EMERGENCY SUPPLY ARRANGEMENTS.—A comprehensive scheme for the provision of emergency electricity supplies in Newcastle-upon-Tyne to maintain essential transport in the event of enemy action has been prepared by the Transport and Electricity Committee of the City Corporation. It provides for a mutual assistance scheme between the Corporation and the Newcastle and District Electric Lighting Co., Ltd., and the North-Eastern Electric Supply Co., Ltd., is to provide a standby high-voltage supply. The total estimated expenditure to be borne by the Corporation amounts to £1,972.

Northern Ireland. — NEW BELFAST TROLLEY-BUSES.—Recently members of Belfast Transport Committee, together with officials, including Mr. Sam Carlisle, acting general manager of the undertaking, had an inspection run in one of the new trolley-buses for the East Belfast service. According to *Modern Transport* the performance and appearance of this vehicle—the tenth to be completed of the 114 A.E.C.-G.E.C. trolley-buses on order—were considered very satisfactory. It is expected that the services to Castlereagh and Cregagh will be in operation early in 1941. The removal of the tram rails on the Falls Road route, already operated by trolley-buses, will begin immediately.

Nottingham. — ADDITIONAL TROLLEY-BUSES.—The Transport Committee has purchased four trolley-buses from Cleethorpes Corporation.

Tynemouth.—"KEARNEY" TUNNEL AS SHELTER.—Among proposals put forward by the borough engineer for the construction of deep air-raid shelters is the building of a tunnel on the style of the Kearney tube railway. It is suggested that the tunnel could be built to such dimensions and depths as would enable it to form part of the proposed Kearney tunnel under the Tyne if the scheme materialised. The plan for a tube railway between North and South Shields railway stations under the Tyne was put forward by Mr. E. W. Chalmers Kearney before the war.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1938

5896. "High-frequency violet-ray apparatus." C. G. Lemon and C. A. Cooper. March 24th, 1939. (526802.)

35931. "Electric plug-and-socket couplings." G. H. Scholes & Co., Ltd., G. H. Scholes, and F. J. Pearce. December 9th, 1938. (526733.)

37627. "Electric circuit-interrupting systems having arc-quenching arrangements." British Thomson-Houston Co., Ltd. December 28th, 1937. (526804.)

1939

1085. "Protective devices for electrical circuits." British Electrical & Allied Industries Research Association, R. H. Golde, H. M. Lacey, W. G. Hawley and W. Nethercot. January 12th, 1939. (Cognate application 17426/39.) (526740.)

1634. "Devices for detecting magnetic metal." E. L. Francis (Illinois Testing Laboratories, Inc.). January 17th, 1939. (526805.)

1907. "Relaxation oscillatory circuits." Fides Ges. für die Verwaltung und Verwertung von Gewerblichen Schutzrechten. January 19th, 1938. (526874.)

2465. "Light-modulating devices." I.M.K. Syndicate, Ltd., P. Nagy, and M. J. Goddard. January 24th, 1939. (Cognate application 2587/39.) (526875.)

3805. "Starting and control switchgear for use with electric motors." F. Heaton. February 6th, 1939. (526741.)

4412. "Light-modulating devices for use in television receivers." I.M.K. Syndicate, Ltd., P. Nagy and M. H. Goddard. February 10th, 1939. (526742.)

5437. "Radiant-heat tube furnaces." W. L. Jones (Electric Furnace Co.). February 18th, 1939. (526746.)

5602. "Luminescent materials." General Electric Co., Ltd., A. H. McKeag and P. W. Ranby. February 20th, 1939. (Cognate application 32230/39.) (526675.)

5906. "Driving mechanisms, particularly adapted for the tuning-elements of radio receivers." British Thomson-Houston Co., Ltd. February 23rd, 1938. (526878.)

5997. "Switching devices for giving warning of the operation of electric circuits or systems." W. F. Russell. February 23rd, 1939. (526809.)

7576. "Load-control systems in electric energy consuming and supply installations." P. Schiller. March 9th, 1939. (526881.)

7696. "Control of electric motors." British Thomson-Houston Co., Ltd. March 9th, 1938. (526750.)

7832. "Railway traffic controlling apparatus." Westinghouse Brake and Signal Co., Ltd., L. H. Peter and D. G. Shipp. March 10th, 1939. (526751.)

8041. "Control of battery-charging dynamo systems in motor vehicles." E. R. Ward. March 13th, 1939. (526752.)

8071. "Electric switches, particularly for electric cookers." C. A. Turner, and "Diamond H" Switches, Ltd. March 13th, 1939. (526754.)

8162. "Adjustable reflectors." G. D. Skinner, and Benjamin Electric, Ltd. March 14th, 1939. (526756.)

8166. "Radio-receiving and the like apparatus." E. H. Roberts. March 14th, 1939. (526757.)

8168. "Electrical transformers." Igranic Electric Co., Ltd., and J. M. Bedford. March 14th, 1939. (526758.)

8420. "Mounting of wringers upon washing machines." British Electric Domestic Appliances (1938), Ltd., and H. A. Eaton. March 16th, 1939. (526759.)

8559. "Thermionic valves and other discharge tubes, and contact-making holders therefor." Philco Radio and Television Corporation. April 18th, 1938. (526820.)

8712. "Contact-making holder for space-discharge devices." Philco Radio and Television Corporation. April 18th, 1938. (526821.)

8713. "Tuning control device for radio receivers and the like." Philco Radio and Television Corporation. April 13th, 1938. (526886.)

8857. "Connectors for electrical conductors or the like." V. G. Manufacturing Co., Ltd., and J. H. Saueressig. March 20th, 1939. (526887.)

8951. "High-speed telegraph signal recording system." Standard Telephones & Cables, Ltd., and C. W. Earp. March 21st, 1939. (526680.)

8953. "Carrier-wave transmission systems." Kolster-Brandes, Ltd., and W. A. Beatty. March 21st, 1939. (526681.)

8960. "Variable inductance mechanisms." Johnson Laboratories, Inc. March 21st, 1938. (526891.)

9026. "Lamp reflectors, globes, or such like." F. W. Thorpe, Ltd., and E. G. Thorpe. March 22nd, 1939. (526953.)

9067. "Electron-discharge devices for use in the transmission of images." M. Bowman-Manifold and H. Miller. March 22nd, 1939. (526954.)

9091. "Fan systems for steam-generating plant." H. W. K. Jennings. (B. F. Sturtevant Co.). March 22nd, 1939. (526691.)

9144. "Electric furnaces." Norske Aktieselskab für Elektrokemisk Industri. June 20th, 1938. (Cognate applications 9145/39, 9146/39 and 9147/39.) (526696.)

9196. "Electric motors, particularly refrigerator motors." Patent-verwertung-Ges. Hermes. March 23rd, 1938. (526697.)

9261. "Time-controlled relays for railway signalling and the like." R. Dell, W. S. Every, and London Passenger Transport Board." March 24th, 1939. (526824.)

9287. "Water-tube steam boilers and like vapour generators." Babcock & Wilcox, Ltd. April 30th, 1938. (Cognate application, 9288/39.) (526825.)

9310. "Rubber compositions having electrical conducting properties." Liverpool Electric Cable Co., Ltd., and L. T. Reynolds. March 24th, 1939. (526894.)

9311. "Electric cables." Liverpool Electric Cable Co., Ltd., and J. T. Frost. March 24th, 1939. (526895.)

9312. "Rubber compositions, and articles composed thereof." Liverpool Electric Cable Co., Ltd., and L. T. Reynolds. March 24th, 1939. (526958.)

9315. "Teleprinter exchange systems." Standard Telephones & Cables, Ltd. (W. Hatton.) March 24th, 1939. (526826.)

9316. "System for the generation or utilisation of electrical oscillations at very high frequency." Standard Telephones & Cables, Ltd. April 1st, 1938. (526827.)

9318. "Electric cables, cords and the like." Standard Telephones & Cables, Ltd., and J. F. Morley. March 24th, 1939. (526959.)

9319. "Electric signalling systems." Standard Telephones & Cables, Ltd., and A. Brown. March 24th, 1939. (526828.)

9320. "Electric selector switches." Standard Telephones & Cables, Ltd., N. H. Martin and K. Mitchell. March 24th, 1939. (526829.)

9321. "Telecommunication exchange systems." Standard Telephones & Cables, Ltd., and E. P. G. Wright. March 24th, 1939. (526830.)

9322. "Arrangements for detecting irregularities in or failure of one or more of a plurality of parallel-fed current-consuming devices." Standard Telephones & Cables, Ltd., and H. G. Kidner. March 24th, 1939. (526831.)

9324. "Superheterodyne receivers." Kolster-Brandes, Ltd., and C. N. Smyth. March 24th, 1939. (526832.)

9325. "Arrangements for receiving telegraph impulses." Creed & Co., Ltd., and F. P. Mason. March 24th, 1939. (526833.)

9347. "High-frequency electric cables." Telegraph Construction & Maintenance Co., Ltd., and E. W. Smith. March 24th, 1939. (526702.)

9351. "Lanterns for electric lamps." British Thomson-Houston Co., Ltd., E. B. Tuppen, and F. W. Thorpe. March 24th, 1939. (526704.)

9401. "Electric lamp bases and sockets." British Thomson-Houston Co., Ltd. March 25th, 1938. (526713.)

9402. "Remote-control apparatus employing controlling direct-current impulses." Landis & Gyr Akt. Ges. April 25th, 1938. (526714.)

9415. "Electro-magnetic transmission wave systems." Telefunken Ges. für Drahtlose Telegraphie. March 26th, 1938. (526719.)

9416. "High-frequency transmitters." Telefunken Ges. für Drahtlose Telegraphie. March 26th, 1938. (526720.)

9417. "Time-delay circuit arrangements and relaxation oscillation generators." Marconi's Wireless Telegraph Co., Ltd., and W. S. Mortley. March 25th, 1939. (526721.)

9418. "Radio-operated automatic pilot systems." Marconi's Wireless Telegraph Co., Ltd., and J. Stewart. March 25th, 1939. (526722.)

9423. "Automatic control of variable conditions." G. Kent, Ltd., and A. Ivanoff. March 25th, 1939. (526771.)

9426. "Thermionic valve circuits." Hazeltine Corporation. April 16th, 1938. (526724.)

9427. "Attenuator circuit for modulated carrier signal receivers." Hazeltine Corporation. April 7th, 1938. (526725.)

9428. "Attenuator for modulated carrier signal receivers." Hazeltine Corporation. April 7th, 1938. (526726.)

9469. "Secondary emissive electrodes." Marconi's Wireless Telegraph Co., Ltd. March 25th, 1938. (526731.)

9470. "Multi-stage centrifugal pumps." Mather & Platt, Ltd. and R. Pennington. March 27th, 1939. (Cognate application 10748/39.) (526732.)

9493. "High-pressure metal-vapour electric-discharge lamps." General Electric Co., Ltd., V. J. Francis, and G. H. Wilson. March 27th, 1939. (526840.)

9508. "Elastic-fluid turbines." British Thomson-Houston Co. Ltd. March 26th, 1938. (526846.)

9509. "Electric gauges." British Thomson-Houston Co., Ltd. March 26th, 1938. (526847.)

9510. "Electric control systems." British Thomson-Houston Co., Ltd. March 26th, 1938. (526848.)

9511. "Electric circuit interrupters with arc extinguishing means." Westinghouse Electric International Co. March 25th, 1938. (526849.)

9520. "Electrolytic polishing of metal surfaces, and an electrolyte therefor." A. H. Stevens (Battelle Memorial Institute). March 27th, 1939. (526854.)

9553. "Navigation aiding radio receiving systems." Marconi's Wireless Telegraph Co., Ltd. September 14th, 1938. (526859.)

9554. "Direct-reading radio direction finders." Soc. Francaise Radio-electrique. April 8th, 1938. (526860.)

9575. "Remote control and supervision of circuit-breakers or the like in electric supply networks." Automatic Telephone & Electric Co., Ltd., and G. A. Burns. March 27th, 1939. (526970.)

9576. "Telephone receivers." R. Mercer (Automatique Electrique de Belgique Soc. Anon.). March 27th, 1939. (526971.)

9612. "Thermionic valves and systems." J. C. M. Brentano. March 28th, 1939. (526869.)

9630. "Dynamo-electric machines." H. List. March 31st, 1938. (526896.)

9671. "Electromechanical apparatus." Reslo (Sound Equipment), Ltd., and L. W. Murkham. March 28th, 1939. (526901.)

(*Continued on page* 354)

FINANCIAL SECTION

New Companies. Capital Returns. Debenture Charges. Bankruptcies and Liquidations. Reports and Dividends. Stocks and Shares

Company Registrations

Bernard Sunley & Sons, Ltd.—Private company. Registered October 10th. Capital £10,000. Objects: To construct, develop and control tramways, gas and electricity works, and to carry on the business of civil, electrical and general engineers, etc. The subscribers are: Nancy M. Grundy, 9, Barnfield Road, Belvedere, Kent, and Joan R. Newman, 12, Arbuthnot Road, New Cross, S.E.14. B. Sunley is permanent governing director. Solicitors: Kenneth Brown, Baker, Baker, Essex House, Essex Street, W.C.2.

Cable and Wireless (Mid-East) Ltd.—Private company. Registered October 14th. Capital, £40,000. Objects: To carry on in India, the Colony of Aden and elsewhere the business of telegraphists, telephonists, proprietors and managers of cable and wireless telegraph and telephone systems, stations and exchanges, etc., and to adopt agreements (1) with Cable & Wireless, Ltd., and (2) with the Eastern Telegraph Co., Ltd., and the Eastern & South African Telegraph Co., Ltd. The directors of Cable & Wireless, Ltd., will be the directors of this company. Solicitors: Bircham & Co., 100, Old Broad Street, E.C.2.

Companies' Returns

Statements of Capital

W. T. Henley's Telegraph Works Co., Ltd.—Capital, £1,500,000 in £1,300,000 ordinary stock and £200,000 preference stock. Return dated July 5th. All stock taken up. £612,480 paid on £413,080 ordinary and £199,400 preference stock. £887,520 considered as paid on £886,920 ordinary and £600 preference stock. Mortgages and charges, nil.

B.E.T. Electricity Supply Co., Ltd.—Capital £750,000 in £1 shares. Return dated July 1st, 1940. 749,000 shares taken up. £440,388 paid. £308,612 considered as paid. Mortgages and charges: £352,333 6s. 8d.

William Geipel, Ltd.—Capital, £25,150 in 25,000 preference, 100 "A" ordinary and 50 "B" ordinary shares of £1. Return dated July 16th. All shares taken up. £23,650 paid on 23,500 preference, 100 "A" ordinary and 50 "B" ordinary. £1,500 considered as paid on 1,500 preference shares. Mortgages and charges, nil.

Associated Manufacturers of Electric Traction Equipment, Ltd.—Capital £10,000 in £1 shares. Return dated July 4th, 1940. All shares taken up. £2,500 (5/- per share) paid. Mortgages and charges: Nil.

Aland & Co., Ltd.—Capital £3,500 in £1 shares. Return dated May 9th, 1940. 3,496 shares taken up. £1,002 paid. £2,494 considered as paid. Mortgages and charges: Nil.

Stuart Electrical Co., Ltd.—Capital, £4,000 in £1 shares. Return dated July 11th. 1,865 shares taken up. £502 paid. £1,363 considered as paid. Mortgages and charges, nil.

Wandsworth Electrical Manufacturing Co., Ltd.—Capital, £25,000 in £1 shares. Return dated July 11th. 18,480 shares taken up. £15,615 paid. £2,865 considered as paid. Mortgages and charges, nil.

Mortgages and Charges

Brush Electrical Engineering Co., Ltd.—Satisfaction (1) to the extent of £840 on August 16th, 1940, of 4½ per cent. redeemable debenture stock secured by trust deed dated March 14th, 1892, and (2) to the extent of £350 on same date of 4½ per cent. redeemable second debenture stock secured by trust deed dated November 1st, 1899, and registered September 30th, 1908, pursuant to Section 12, 1907, Act.

Notek Electric Co., Ltd.—Particulars filed of £250 debentures authorised October 2nd, 1940, charged on the company's undertaking and property, present and future, including uncalled capital (subject to first debenture dated July 24th, 1940), the amount of the present issue being £200.

Aylesbury Battery and Electrical Co., Ltd.—(*a*) Debenture, charged on the company's undertaking and property, present or future, dated September 21st, 1940, to secure all sums which the chargee may be called upon to pay under a charge for £300 dated September 21st, 1940, in favour of Bucks Land & Building Co., Ltd. Holder: Anne C. Fisher, New Street, Aylesbury. (*b*) Mortgage on Sydenham House, 32, Havelock Street, Aylesbury, dated September 21st, 1940, to secure £950. Holders: Bucks Land & Building Co., Ltd., 7, Temple Square, Aylesbury.

Scheme Sanctioned

Baird Television Ltd.—Last week Mr. Justice Bennett, in the Chancery Division, approved the scheme of arrangement proposed by this company which had been adjourned from August 27th. Counsel for the company said that an opportunity had been given to opponents of the scheme but so far as he was aware none of these had proceeded with their opposition. The Gaumont-British Picture Corporation, which directly or through companies associated with it held 94 per cent. of the stock, had agreed to provide £30,000 of new capital to enable the Baird Company to carry on. The scheme would preserve to the unsecured creditors and members a small contingent participation in the assets. A merger would be effected with Cinema Television and there would be an exchange of holdings.

Bankruptcies

J. V. Reynolds (trading as British Electrical Installations Co.), 7, Lambs Conduit Street, London, W.C., and as "Arundel" at Totteridge Lane, Hertford, electrical engineer.—This debtor applied for his discharge at the London Bankruptcy Court on October 15th before Mr. Registrar Parton. The Official Receiver reported that the debtor failed recently with liabilities of £3,994, and the assets had been valued at £4,069. The debtor attributed his failure to loss of business through the war, and other causes. The discharge was granted subject to a suspension of 15 months.

J. Stubbs and J. A. P. Boulton (John Stubbs & Co.), electrical engineers, 39, Bootham, York. (Separate application of J. Stubbs).—Application for discharge to be heard on November 19th, at the Law Courts, Clifford Street, York.

Liquidations

Power, Radiance & Co., Ltd., electricians, 70, Ashby Road, Loughborough.—Pursuant to Section 238 of the Companies Act, 1929, a meeting of the creditors was held on October 10th at Nottingham. A statement of affairs was submitted showing ranking liabilities of £1,028 and net assets of £603, leaving a deficiency, as regarded the creditors, of £425. The issued capital was £760, and so far as the shareholders were concerned there was a deficiency of £1,185. The creditors decided that the voluntary liquidation of the company should be confirmed with Mr. C. B. Brecknock, of Winkley & Clarke, C.A., King Street, Nottingham, as liquidator, with a committee.

Shields Radio Co., Ltd.—Meetings, on November 4th, pursuant to Section 245 of the Companies Act, 1929, at 43, King Street, South Shields, to receive an account of the winding-up by the liquidator, Mr. G. N. Randle.

Clifford Vowles, Ltd.—Particulars of claims by November 25th to Messrs. E. C. Astin & C. H. Baker, c/o Charles H. Baker & Co., 3, Alfred Street, Boar Lane, Leeds, 1.

Add Reports and Dividends

Eastern Wireless Co., Ltd.—Winding up voluntarily. Liquidator, Mr. F. S. Parsons, Bank Buildings, 1, High Street, Croydon.

Reports and Dividends

Ferranti, Ltd., report earnings for the past year on trading, dividends on investments, etc., of £141,693, as compared with £117,991 in the preceding year. In each case earnings were struck after taxation. Depreciation requires £61,438 and the net profit is £78,159 (against £79,383). Contingency reserve receives £20,000 and the

(*Continued on page 357*)

New Patents (*concluded*)

9683. "Control of electrical cooking apparatus." Proctor & Schwartz, Inc. April 14th, 1938. (526906.)

9721. "Direct-current electric motor equipments." G. M. Pestarini. March 28th, 1939. (526912.)

9743. "Electric power transmission." A. M. Taylor. March 29th, 1939. (526913.)

9775. "Electric tumbler switches." R. H. Baker and C. W. Parsons. March 29th, 1939. (526918.)

9824. "Electric lamps." British Thomson-Houston Co., Ltd. March 29th, 1938. (526924.)

9826. "Vacuum cleaners." British Thomson-Houston Co., Ltd., T. F. Stent and W. A. Bocock. March 29th, 1939. (526925.)

9866. "Electric contactor switches." W. T. Gray, F. Whyman and Metropolitan Vickers Electrical Co., Ltd. March 29th, 1939. (526929.)

9867. "Direct-current electric motors." General Railway Signal Co. March 30th, 1938. (52693.0)

9919. "Electro-magnetic interrupters." Ericsson Telephones, Ltd., and L. S. Diston. March 30th, 1939. (526940.)

9974. "Electric motor control systems." Westinghouse Electric International Co. March 30th, 1938. (526974.)

9979. "Duplicate busbar metalclad switchgear." British Thomson-Houston Co., Ltd., H. E. Cox and A. C. Gibson. March 30th, 1939. (526975.)

9980. "Limitation of short-circuit currents in electric distribution systems." British Thomson-Houston Co., Ltd. March 31st, 1938. (526976.)

9982. "Absorption refrigerating apparatus." Electrolux, Ltd. April 7th, 1938. (526977.)

9998. "Transformers for band-pass selectors." Hazeltine Corporation. April 14th, 1938. (526982.)

10000. "Method and apparatus for deriving delayed secondary signals from a primary signal." P. C. Goldmark. June 30th, 1938. (526984.)

10018. "Printing-telegraph receiving apparatus." Marconi's Wireless Telegraph Co., Ltd. March 30th, 1938. (Addition to 514,588.) (526988.)

10051. "Rotary electrical switches." Santon, Ltd., and H. C. Sanders. March 31st, 1939. (526990.)

10067. "Electrical transmission and/or distribution systems for musical and like programmes." Ericsson Telephones, Ltd., and L. H. Drysdale. March 31st, 1939. (526996.)

12278. "Light-modulating devices for use in television receivers." I.M.K. Syndicate, Ltd., P. Nagy and M. J. Goddard. February 10th, 1939. (Divided out of 526742.) (527009.)

25250. "Electric melting furnaces intended particularly for the manufacture of glass." Soc. Anon. des Manufacturers des Glaces et Produits Chimiques de Saint-Gobain, Chaunty and Cirey. September 17th, 1938. (526799.)

27053. "Voltaic cell devices." A. H. Stevens (Winckler Engineering Laboratories, Inc.). October 2nd, 1939. (526800.)

STOCKS AND SHARES

Tuesday Evening

THIS week will enable Stock Exchange markets to function under conditions more normal than those of the few previous business days. Deprived, then, of their usual market-places, members carried on their dealings in the Settling Room beneath the floor of the House. Return to their ordinary and normal course caused brokers and jobbers to appreciate, more than they had ever done before, the advantage of a local habitation as well as a name. Prices have remained good, with advances in gilt-edged and Home Railway stocks. Capital flows steadily into industrial shares. A greater volume of business this week should help to compensate for the check temporarily laid by broken glass upon the chances of market activity.

Gilt-Edged Strength

The 3½ per cent. War Stock has assumed that leadership of Stock Exchange markets which, prior to the last war, was held by Consols. On Friday in this week the price will be quoted ex the half-yearly interest payable on December 1st next. A year ago, the price was under 90; to-day it stands nearer 103. The price has risen rapidly of late under the influence of extensive purchases and these have had a strengthening effect upon other purely investment issues. Central Electricity stocks still stand outside the circle of trustee securities, although their inclusion in that charmed group has been frequently and justifiably urged. Their quotations are governed, however, by those of the British Government and similar groups, and, from being none too good a market—to drop into Stock Exchange vernacular—they are now advancing into favour. Although the nominal prices show little change week by week, the actual position is distinctly better from the point of view of the holder, in that he can be assured there are buyers going round the market trying to get hold of the stocks, and prepared to give more than they were willing to pay a few weeks back.

Home Railway Hopes

The Government has allowed it to become known that very shortly an official announcement may be expected in the matter of the proposed increase in freight and passenger charges. For some reason, this is construed as a bull point. It has led to a mild improvement in the prices of the junior stocks. Prior-charge descriptions have been put up here and there, but not to any material extent. Whatever damage may be anticipated as a consequence of air-raid activity is not allowed, for the moment, to depress prices. The Government's plan for compulsory insurance is read as a partial removal of the uncertainty previously felt as to the possible loss in which railway companies might find themselves involved by destruction of their property. A more cheerful view is now taken of the outlook for the Home Railway companies. One other factor is deserving of mention. Even from hitherto bitter opponents of nationalisation may be heard an occasional admission that the experience now being gained of joint working arrangements will perhaps be of service, after the war, in pointing the way to economies, and to the reduction of redundancies in Home Railway operation.

Japan and the Axis

After standing in the neighbourhood of 50 for some weeks past, Tokyo Electric 6 per cent. bonds experienced a sudden fall on the attitude adopted by Japan in the negotiations with the "Axis" powers. From 52½, the price of the bonds has fallen to 30 within a week. So far, the interest on the bonds has been regularly met, but, following a shrinkage in the prices of Japanese Government bonds, Tokyo sixes collapsed to the figure just mentioned. Interest is due in June and December, and the last recorded business was at 54 early in June this year. It takes courage as well as capital, to buy the bonds at the present price, which is the lowest touched for several years past.

Debenture Stocks

Rightly or wrongly, it is deemed that Sir Kingsley Wood has made clear his intention to introduce no fresh Budget until the normal time next year. The Chancellor of the Exchequer had been credited—or debited—with the wish to produce an autumn Budget in which income-tax might be expected to play a further penalising part. When it is remembered that a gross yield of 4 per cent. becomes a net return of £2 6s. 0d. with tax at 8s. 6d. in the £, investment may be pardoned a demand for higher things. Nevertheless, so closely has the Treasury established its hold upon money rates, that gilt-edged industrial debenture stocks stand at prices allowing an income even lower than 4 per cent. This makes it worth while to mention that City of London Electric Lighting 5 per cent. debenture, repayable at 100 in 1971, is on offer in a modest way at 110, giving 4½ per cent. on the money now, and £4 8s. per cent. by taking repayment into account. Lancashire Electric 5 per cent. debenture stock can be bought at 109, paying £4 11s. 9d. at that price. The stock is redeemable at 100 by 1980 by purchase up to or by drawings at 100 by means of a ½ per cent. cumulative sinking-fund now in operation. Assuming repayment at 100 in 1980, the return is £4 10s. per cent. The Company has the right to repay the issue between 1951 and 1970 at 105.

Nigerian Electric Recovery

The Nigerian Electricity Supply Corporation publishes results which compare remarkable well with those of the previous twelve months. The company has declared an interim dividend of 4 per cent. on the ordinary capital, which came as the more pleasant surprise in view of the passing of the dividend last July for the year 1939-40. The company had been suffering by reason of the low tin export quota before the war; but after September in last year tin exports leaped ahead. America decided to build up a reserve of 75,000 tons of tin, and thanks to this, the Corporation will probably show very good results at the end of the financial year. The price of the £1 shares stands about 12s., but there is little market in them and they seldom change hands. The last recorded business was at 9s. on the 11th of this month.

Jerusalem Electric

The Jerusalem Electric and Public Service Corporation has maintained its dividend of 7 per cent. for the year recently ended, but the chairman at last week's general meeting of the company stated that adverse factors may prevent a repetition of as favourable an account next time. He mentioned that returns for the first five months of the current year show little diminution from those of the comparable period. The Corporation has made good progress; distribution efficiency attained a high standard. On the other hand, the increase in operating costs and the loss of revenue due to war conditions have to be taken into account. The price of the shares is unchanged at 18s. 9d., at which the yield, on the basis of the 7 per cent. dividend, is practically 7½ per cent. on the money. The chairman's speech at the meeting will prepare shareholders for a possible reduction in the net earnings, though it is hoped that matters will remain sufficiently quiescent for the company to be able to carry on at the present satisfactory rate of progress.

Miscellaneous Matters

Cable and Wireless stocks are unchanged on the week. There is a little business doing in the ordinary stock around 50 and investment goes on, though rather spasmodically, in the 5½ per cent. preference at about 86. A new company has been formed by Cable and Wireless called Cable and Wireless (Mid East) in connection with operations in India and the Colony of Aden. The nominal capital is £40,000

Anglo-American Telegraph stocks hold the rises which they secured a fortnight ago. The company has declared a third interim dividend on the ordinary stock of 13s. 6d. per cent. less tax, payable November 1st. This makes £2 3s. 6d. per cent. for the year so far, an improvement of 6d. per cent. over the corresponding period of 1939-40.

Few changes of consequence have taken place amongst the shares of equipment and manufacturing companies. Telephone Constructions are 1/16 better at 31s. 3d. and a similar rise has made the 10s. shares of Crabtree 21s. 3d. S. Smith 1s. shares at 7s. 6d. have risen 1s. 3d. Iron and steel shares have come to the front and in the improvement Babcock & Wilcox participate with a gain of 2s. 6d. to 35s. Vickers hold their previous rise at 14s.

Enemy Action

The refusal of Stock Exchange markets to be baffled in business by enemy action has been well illustrated recently. Brokers and jobbers have declined to be deterred from making an effort to keep the markets going. Numbers assembled in the Stock Exchange Settling Room and dealings were carried on there in the usual manner, while the telephones were in such continuous operation as to imply the transaction of business in many stocks and shares. Not a price was lowered. If the enemy consulted the list of securities with a view to a possible gloating over destruction of investors' morale, he must have suffered grievous disappointment at the obvious failure of his attempt to terrorise the markets. The volume of business contracted, it is true, but prices are no more affected by explosives than they would be by an October shower of rain.

Registration of Companies

THE head office of the Registrar of Companies in England has been moved to the Grand Hotel, Llandudno. The office at Bush House will be maintained only for the inspection of the index to the names of companies, inspection of the files of companies formed before October 18th, 1940, preparation of copies of documents and of certificates required under Section 314 of the Companies Act, 1929, and the sale of company registration forms.

The office of the Registrar of Business Names has also been moved to the Grand Hotel, Llandudno, that at Chansitor House, Chancery Lane, being closed.

ELECTRICAL COMPANIES' SHARES

Prices, Dividends and Yields

Company	1940 Highest	1940 Lowest	Dividend Previous	Dividend Last	Middle Price Oct. 21	Rise or Fall	Yield p.c.
Home Electricity Companies							£ s. d.
Bournemouth and Poole	63/6	37/6	15	15	37/6	..	—
British Power and Light	30/–	21/–	7	7	23/6	..	5 19 2
City of London	28/–	20/–	7½	7½	20/–	..	—
Clyde Valley	38/6	25/–	8	8	31/3	..	5 2 5
County of London	43/3	22/–	10½	10½	26/3	..	8 0 0
Edmundson's:							
7% Pref	31/6	26/3	7	7	28/3	..	4 19 1
Ord.	27/6	18/6	9	6	22/–	..	5 9 1
Elec. Dis. Yorkshire	40/3	32/6	9	9	32/6	..	5 10 9
Elec. Fin. and Securities	41/3	34/6	12½	12½	38/9	..	6 9 0
Elec. Supply Corporation	46/3	37/–	12	11½	37/0	..	6 4 4
Isle of Thanet	16/–	5/6	4	4	6/–	..	—
Lancs Light and Power	33/–	25/–	7½	7½	25/0	..	5 16 6
Llanelly Elec.	21/–	17/–	5½	5½	17/6	..	6 5 9
Lond. Assoc. Electric	21/–	12/6	7	5½	13/3	+9d.	—
London Electric	37/6	19/–	8	7	20/–	..	7 0 0
London Power Deb. Red.	105½	101	5	5	100½	..	4 19 6
Metropolitan	41/6	23/6	12	10	27/6	..	7 5 6
Midland Counties	39/–	24/3	8	8	27/6	..	5 16 5
Mid. Elec. Power	40/–	29/6	9	9	32/–	..	5 12 6
Newcastle Elec.	29/9	22/6	7	7	22/6	..	6 7 3
North Eastern Elec.:							
Ordinary	31/6	17/6	7	7	22/6	..	6 4 5
7% Pref.	32/6	26/6	7	7	27/6	..	5 1 10
Northampton	48/–	39/–	10	10	38/9	..	5 3 3
Notting Hill 6% Pref. (£10)	10½	9	6	6	9	..	—
Northmet Power:							
Ordinary	42/3	23/–	10	10	28/3	..	—
6% Pref.	29/–	23/–	6	6	26/–	..	4 12 4
Richmond Elec.	24/6	18/–	7	6	18/9	..	—
Scottish Power	38/–	24/–	8	8	28/9	..	5 11 5
Southern Areas	21/3	13/9	5	5	12/6	..	8 0 0
South London	23/3	20/–	7	7	20/–	..	7 0 0
West Devon	20/–	18/6	5	5	20/–	..	5 0 0
West Glos.	21/3	15/–	2½	4½	16/3	..	5 10 10
Yorkshire Elec.	40/–	24/6	8	8	28/9	..	5 11 4
Overseas Electricity Companies							
Atlas Elec.	4/–	1/3	Nil	Nil	1/9	..	—
Calcutta Elec.	37/–	22/6	10*	8*	29/–	..	5 10 6
Cawnpore Elec.	30/–	24/–	10	10	25/–	..	8 0 0
East African Power	25/6	20/–	7	7	20/–	..	7 0 0
Jerusalem Elec.	24/–	17/9	7	7	18/9	..	7 9 4
Kalgoorlie (10/-)	12/6	9/6	7½	7½	11/–	..	6 16 5
Madras	26/9	23/6	8*	6*	25/–	..	4 16 1
Montreal Power	35½	30	1½	1½	32	..	—
Palestine Elec. "A"	25/–	12/6	5*	Nil	12/6	..	—
Perak Hydro-electric	20/3	13/6	6	2½	13/9	..	3 12 9
Shawinigan Power	27½	19	83cts.	90cts.	20	..	—
Tokyo Elec. 6%	69	52	6	6	30	—22½	20 0 0
Victoria Falls Power	75/9	56/–	15	15	65/–	..	4 12 4
Whitehall Investments Pref.	17/9	8/–	7½	7½	10/–	..	15 0 0
Public Boards							
Central Electricity:							
1950–70	110½	104	5	5	104½	..	4 15 8
1955–75	112½	106	5	5	107½	..	4 13 0
1951–73	107½	102	4½	4½	103½	..	4 7 10
1963–93	96½	90	3½	3½	91	..	3 17 0
London Elec. Trans.Gtd.	92	87½	2½	2½	92	..	2 14 4
London & Home Counties							
1955–75	113½	105	4½	4½	105½	..	4 5 4
Lond. Passenger Transport:							
A	116	104	4½	4½	106	—1	4 5 0
B	116	102½	5	5	104½	..	4 15 8
C	65½	25	1½	1½	27	..	5 11 2
West Midland Joint Elec.							
1948–68	106½	103	5	5	105½	..	4 14 9
Telegraph and Telephone							
American Tel. & Tel.	215	180	9	9	200	..	4 10 0
Anglo-Am. Tel.:							
Pref.	106	85	6	6	92½	..	6 9 5
Def.	23½	18	1½	1½	21½	..	6 19 6
Anglo-Portuguese	22/6	10/–	8	8	15/–	..	10 13 4
Cable & Wireless:							
5½% Pref.	99½	70	4½	5½	86	..	6 8 0
Ord.	65	28½	4	4	50	..	8 0 0
Income	99½	93	..	..	97	..	4 0 0
Canadian Marconi $1	6/–	4/–	Nil	4cts.	4/6	..	—
Globe Tel. & Tel.:							
Ord.	32/6	21/6	7½*	6*	25/–	..	4 16 0
Pref.	22/9	22/6	6	6	23/9	..	5 1 1
Great Northern Tel. (£10)	20	11	20	20	13½	..	—
Inter. Tel. & Tel.	5½	3	Nil	Nil	3½	..	—
Marconi-Marine	30/–	18/3	10	7½	18/9	..	8 0 0
Oriental Telephone Ord.	2⅞	47/6	12*	11½*	2½	..	4 16 10
Telephone Props.	15/–	11/–	5	6	12/6	..	9 12 0
Telephone Rentals (5/–)	9/6	5/9	10	10	6/3	..	8 0 0
Traction and Transport							
Anglo. Arg. Trams:							
First Pref. (£5)	4/3	1/3	Nil	Nil	2/–	..	—
4% Inc.	11½	2	Nil	Nil	4½	..	—
British Electric Traction:							
Def. Ord.	830	440	5	45	700	..	6 8 7
Pref. Ord.	169	134	8	8	140	..	5 14 3
Bristol Trams	48/6	34/6	10	8*	35/–	..	—
Brazil Traction	12½	5½	$1	50c.	5½	..	—
Calcutta Trams	24/–	16/3	8	5½	17/–	..	6 9 4
Cape Elec. Trams	18/6	16/–	5	5	17/–	..	5 17 8
Lancs Transport	35/–	27/6	10	10	30/–	..	6 13 4
Mexican Light:							
1st Bonds	36	27	5	5	35	..	—
Rio 5% Bonds	95	74	5	5	95	..	5 5 3
Southern Rly.:							
5% Prefd.	79	35	5	5	41½	..	12 1 0
5% Pref.	104½	60	5	5	71½	..	7 0 0
T. Tilling	45/9	31/–	10	10	37/6	..	5 6 8
Tilling & B.A.	47/6	41/9	9*	8*	42/–	..	—
West Riding	35/–	26/–	10	10	31/–	..	6 9 0
Equipment and Manufacturing							
Aron Electricity Ord.	17/6	10/–	15	Nil	14/–	..	—
Assoc. Elec.:							
Ord.	43/3	27/–	10	10	35/–	..	5 14 4
Pref.	35/3	32/3	8	8	33/9	..	4 14 10
Automatic Telephone & El.	47/3	32/–	12½	12½	37/6	..	6 13 4
Babcock & Wilcox	50/–	28/6	10	11	35/–	+½	6 5 9
British Aluminium Ord.	56/–	33/–	12½	12½	37/–	..	—
British Insulated Ord.	92/6	67/–	20	20	75/–	..	5 6 8
British Thermostat (5/–)	14/9	6/6	18½	18½	8/9	..	10 11 6
British Vacuum Cleaner (5/-)	12/6	4/9	40	12½	6/3	..	10 0 0
Brush Ord.	4/6	1/9	Nil	Nil	2/6	..	—
Callender's	69/–	46/–	15	15	55/–	..	5 9 3
Chloride Elec. Storage	72/6	55/–	15	15	2⅞	..	5 4 4
Consolidated Signal	72/6	59/–	36½	17	60/–	..	5 13 4
Crabtree (10/–)	24/9	17/6	17½	17½	21/3	+⅛	8 4 9
Crompton Parkinson:							
Ord. (5/–)	20/–	12/6	30	20	13/9	..	7 5 6
E. K. Cole (5/–)	5/–	2/6	10	Nil	3/6	..	—
Elec. & Musical Industries (10/–)	10/3	4/3	5	Nil	8/6	..	—
Electric Construction	36/3	37/6	13½	10	27/6	..	7 5 6
Enfield Cable Ord.	56/–	40/6	25	16½	43/9	..	7 8 5
Electrical Switchgear (10/-)	22/6	20/–	16	10	20/–	..	5 0 0
English Electric	33/9	16/6	10	10	25/–	..	8 0 0
Ensign Lamps (5/–)	15/3	12/6	25	25	13/9	..	9 1 10
Ericsson Tel. (5/–)	39/3	25/–	25*	25*	25/–	..	—
Ever Ready (5/–)	28/3	17/3	30	40	25/–	+6d.	8 0 0
Falk Stadelmann	18/3	12/6	6	7	13/9	..	10 3 3
Ferranti Pref.	25/–	23/–	7	7	23/3	..	6 0 5
G.E.C.:							
Pref.	32/6	27/–	6½	6½	28/9	..	4 10 6
Ord.	83/3	56/–	20	20	70/–	..	5 14 1
Greenwood & Batley	25/6	20/–	15	13	20/–	..	13 0 0
Hall Telephone (10/–)	18/6	8/9	15	10	11/3	..	8 17 10
Henley's (5/–)	21/6	13/6	20	20	17/6	..	5 14 3
4½% Pref.	21/3	20/6	4½	4½	21/3	..	4 4 8
Hopkinsons	46/9	33/6	12½	15	33/9	—⅛	8 18 0
India-Rubber Pref.	21/–	20/–	5½	5½	21/3	..	5 3 6
Intl. Combustion	121/3	70/–	32½	32½	8⅛	..	8 13 4
J. Lucas	60/6	40/–	15	15	47/6	..	6 6 4
Johnson & Phillips	50/9	33/–	12½	15	40/–	..	7 10 0
Lancashire Dynamo	59/9	47/6	25	20	47/6	..	8 8 5
Laurence Scott (5/–)	11/–	6/–	15	15	8/–	..	9 7 6
London Elec. Wire	25/6	20/–	7½	7½	22/6	..	6 13 4
Mather & Platt	46/6	30/–	13½	10	33/9	..	5 18 6
Metropolitan Elec. Cable Pf.	22/–	21/3	5½	5½	21/3	..	5 3 6
Murex	86/9	52/6	20	20	67/6	..	5 18 4
Pye Deferred (5/–)	9/–	6/9	25	25	8/9	..	14 5 3
Revo (10/–)	20/9	11/6	17½	5	17/6	+3d.	2 17 6
Reyrolle	60/6	41/–	12½	12½	45/–	..	5 11 2
Siemens Ord.	23/9	16/3	7½	7½	16/3	..	9 4 3
Strand Elec. (5/–)	2/3	9d.	10	4	1/3	..	16 0 0
S. Smith (1/–)	8/–	3/6	37½	50	7/6	+⅛	6 13 4
Switchgear & Cowans (5/–)	11/9	5/6	20	10	6/3	..	8 0 0
Telegraph Condenser (10/–)	8/9	6/3	5	..	7/–	..	—
Telegraph Construction	42/6	29/–	10	10	31/3	+⅛	6 8 0
Telephone Mfg. (5/–)	9/–	5/–	9	9	5/9	..	7 16 6
Tube Investments	96/9	61/3	23½	23½	82/6	..	5 16 0
Vactric (5/–)	3/6	2/–	4	Nil	2/3	..	—
Vickers (10/–)	22/–	9/6	10	10	14/–	..	7 2 10
Ward & Goldstone (5/–)	19/9	12/6	20	20	12/6	..	8 0 0
Westinghouse Brake	46/–	32/6	17½	10	32/6	..	6 3 1
Walsall Conduits (4/–)	26/6	17/6	55	55	23/9	..	9 5 0
West, Allen (5/–)	7/–	3/–	10	7½	3/9	..	10 0 0

* Dividends are paid free of Income Tax.

CONTRACT INFORMATION

Particulars of work for which tenders are invited, contracts placed, and building schemes promising work for electrical contractors and traders

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses. Further details of items marked with an asterisk can be obtained from the Department of Overseas Trade (Inquiry Room), Great George Street, London, S.W.1.

Australia. — MELBOURNE.— Posts and Telegraphs Department. November 5th. Telephone switchboard keys. (T.22242/40.)*

SYDNEY.—County Council. One 50,000 kW steam turbo-alternator set for Bunnerong power station. The closing date for the receipt of tenders has been extended from October 24th to January 9th, 1941.

Bury.—October 28th. Town Council. Lighting installation at first-aid post. Borough engineer, Bank Street, Bury (deposit, £1).

Eire.—DUBLIN.—October 30th. Port & Docks Board. Two glass-bulb mercury-arc rectifiers. Specification from the Engineer, East Wall, Dublin. Tenders to the Secretary, 19, Westmorland Street, Dublin.

Kettering.—October 28th. Electricity Department. Electric delivery van. (October 4th.)

Morecambe and Heysham.—October 26th. Electricity Department. One 750-kVA and one 75-kVA transformers. (October 11th.)

New Zealand.—WELLINGTON.—Public Works Department. November 5th. 110-kV gang-operated outdoor type switchgear. (T. 21700/40.)*

November 26th. 40-ton three-motor electric overhead travelling crane. (T.22012/40.)*

January 14th. Two 3,000-kVA, 11-kV, three-phase, 50-cycle outdoor-type voltage regulating transformers and control equipment for the Matmata and Edgecombe substations. (T.22238/40.)*

South Africa.—PRETORIA.—Union Tender & Supplies Board. November 14th. 10 batteries each of 12 cells. (T. 21981/40.)* 7,500 telephones, table, magneto. (T. 21980/40.)*

CAPE TOWN.—November 12th. Electricity Supply Commission. Two 300-kVA three-phase transformers. (T. 21801/40.)*

November 18th. 910 yd. 0.2 sq. in. three-core belted type cable, 11,500/12,000 V, and 910 yd. six-core 7/.029 in. pilot cable. (T. 21988/40.)*

November 20th. City Council. Low-voltage industrial-type switchboard. (T. 22052/40.)*

December 4th. Laundry equipment. (T. 21987/40.)*

JOHANNESBURG.—November 14th. City Council. Electric lighting fittings for new magistrates' courts. (T. 21976/40.)*

KIMBERLEY.—October 31st. City Council. 33-kV transmission system between central power station of De Beers Consolidated Mines, Ltd., and Vaal River municipal waterworks (18½ miles). (T. 21888/40.)*

Straits Settlements.—SINGAPORE.—November 11th. Municipal Electricity Department. Three 300-kVA and five 500 kVA static transformers. (T. 1826/40.)*

Yorkshire.—October 26th. Installation of automatic telephone exchange system at County Institution, Skipton. A. Booth, County Hall, Wakefield.

Orders Placed

Barrow-in-Furness. — Electricity Committee. Accepted. Two e.h.v. panels for Graving Dock (£607) and rotary convertor repairs, Buccleuch Street works (£141).—B.T.H. Co.

Birmingham. — Electricity Committee. Accepted during the past three months. Construction of two ferro-concrete cooling towers and ponds, culverts and other works. —Fred Mitchell & Son, Ltd. Electrostatic flue-gas cleaning plant.—Lodge-Cottrell, Ltd. Cable-jointing compound for twelve months ending June 30th, 1941.—Callender's Cable & Construction Co., Ltd.; Dussek Bitumen & Taroleum, Ltd. E.h.v. metalclad switchgear for substation.—G.E.C.; Switchgear & Cowans, Ltd. E.h.v. switchgear for power station.—Ferguson, Pailin, Ltd. Extensions to metalclad switchgear at power station.—Ferguson, Pailin, Ltd. Two transformers for power station.—Hackbridge Electric Construction Co., Ltd.

Salvage Committee. Accepted. Twelve electric vehicles.—Electricars, Ltd. Electric batteries for one year.—Young Accumulator Co., Ltd.

Bury.—Town Council. Accepted. Electrical work in connection with extensions to workshops.—J. Downham, Ltd.

Carlisle. — Electricity Committee. Accepted. Extensions at power station:—One 30,000-kW turbo-alternator and one Mirrlees Delas surface condenser, one 750-kW generating set and 33-kW, 400-V switchgear.—B.T.H. Co., Ltd. Two boilers with economisers, and two sets of fans and grit arrestors.—Stirling Boiler Co., Ltd.

(*Continued on next page*)

Financial Section (*Concluded*)

ordinary dividend for the year is maintained 6 per cent., tax free. The balance carried forward is £68,200 (as against £63,041 brought in). Last year in addition to the dividend there was a further distribution to ordinary holders of a capital profit of £7,388 realised on sale of investments.

Palestine Electric Corporation Ltd. — Last week the holders of the company's 4½ per cent. redeemable cumulative preference shares received a circular asking them for tenders of shares for redemption. The circular mentioned that there was now £11,500 available for the redemption of the shares and tenders were asked for by October 21st.

The Jerusalem Electric & Public Service Corporation, Ltd.—Presiding at the annual meeting on October 17th, Mr. W. Shearer (chairman) said that the business of the Corporation had continued to progress during the year under review, although profits had been affected by rising costs. Consumers connected (including industrial load) and kWh sold were satisfactory, while distribution efficiency had attained a high standard. With regard to the current year, while returns for the first five months showed little diminution on the comparable period of the previous year, it must be borne in mind that the loss of revenue from war conditions and continued increases in operation costs might prevent the submission of as favourable an account next year.

E. K. Cole, Ltd., held their annual meeting on October 16th, when Mr. W. S. Verrells (chairman) said that from the beginning of the year under review up to the outbreak of hostilities in September the uncertainty then existing affected to some extent the production and sales of radio receiving sets and other domestic products. From September onwards immediate and progressive moves were put into operation to adapt their production resources to a war basis. A number of other factory premises were found, plant and machinery moved, executive and personnel transferred, and new plant and machinery installed, with a complete organisation of administrative control to take care of these new developments. Production on Government contracts was now in full swing. Their order book was full and the capacity of the new factories taxed to its utmost. Shareholders would appreciate that the benefits from much of the work carried out during the year would not accrue until the accounts for the current year were presented.

Scophony, Ltd., the television company in which they held a substantial interest, was inevitably faced with great difficulties at the beginning of the war. These difficulties, however, had been partly overcome and the company was now engaged on Government work, both direct and as sub-contractors. Scophony should be able to carry through the war period until it could redirect its activities to the objects for which it was formed.

The Cables Investment Trust reports that the income from its holdings for the year to June 30th amounted to £333,428, as compared with £344,308 in the preceding year, which with further credits made £345,850. The net revenue was £228,222 (against £219,259) to which is added £97,733 brought in, making £325,955. The final ordinary dividend is 3 per cent., making 5 per cent. for the year (same) and £135,955 is carried forward.

The United River Plate Telephone Co., in a preliminary statement, reports gross earnings for the six months to June 30th of £2,125,345, as compared with £1,803,790 for the corresponding period of 1939. After deducting operating expenses, depreciation, general and debenture interest, &c., the net income is £433,958 (against £320,188). The number of telephone stations has risen during the six months by 9,746 to 397,260.

The Renold & Coventry Chain Co., Ltd., reports income from investments and profit on trading after charging for depreciation for the year ended June 30th of £183,330 (no account taken of results of subsidiaries), as compared with £148,782, including profits of subsidiaries. The net profit is £99,330 (against £90,702), contingencies reserve receives £30,000 and the final ordinary dividend is 7 per cent., again making 10 per cent. for the year, leaving £21,407 to be carried forward (against £15,541 brought in).

The Anglo-American Telegraph Co. has declared a third interim dividend on the £205,100 ordinary stock in respect of the quarter to September 30th of 13s. 6d. per cent., less tax. This makes £2 3s. 6d. per cent. so far, against £2 3s. per cent., for the corresponding period of 1939–40.

The Nigerian Electricity Supply Corporation is resuming dividend payment with an interim of 4 per cent., less tax, in respect of the year to February 28th, 1941. The previous distribution was 3½ per cent., less tax, for 1938–39, plus a capital bonus of 10 per cent.

The Metropolitan Electric Cable & Construction Co., Ltd., has announced an interim dividend of 2 per cent., less tax. No. interim was made a year ago, but the distribution for the whole of 1939 was 7½ per cent.

Thos. W. Ward, Ltd., have announced a final dividend of 7½ per cent. (against 7 per cent.) on the ordinary shares, making 11½ per cent., less tax, for the year to June 30th (against 10 per cent.).

The Calcutta Electric Supply Corporation, Ltd., is maintaining its interim dividend at 4 per cent., tax free.

The Electrical Finance & Securities Co., Ltd., is again paying an interim dividend of 4 per cent.

The Telephone & General Trust, Ltd., has declared an interim dividend of 3 per cent. (unchanged).

Max Stone, Ltd., are paying an ordinary dividend of 10 per cent. for the year (against 6 per cent.).

The Eastern Telegraph Co. has announced an interim dividend of 4 per cent. (same).

Pinchin Johnson & Co., Ltd., have declared an interim ordinary dividend of 2½ per cent. (against 4 per cent.).

Dewsbury.—Town Council. Accepted. Installation of an electrical air-raid warning alarm system (£3,542).—Standard Telephones and Cables, Ltd.

Doncaster and Mexborough.—Joint Hospital Board. Accepted. Electrical installation at the Conisborough Isolation Hospital (£136).—Pearson & Sons, Doncaster.

Eccles.—Electricity Committee. Accepted. 500-kVA transformer (£342), switch cubicle (£190) and switchgear (£663).—Metropolitan-Vickers Electrical Co. Cable.—British Insulated Cables, Ltd.

Eire.—Commissioners of Public Works.—Electrical work and supplies in the Dublin district.—Brooks, Thomas & Co., Dublin. Electrical installations, Kilkenny, Mullingar, and Templemore.—Hadens Engineering Co., Ltd., Dublin.

Glasgow. — Electricity Committee. Accepted. Alterations to substation to prevent damage to plant by fumes from adjoining gasworks (£420).—Hunter & Clark, Ltd.

Police Committee. Accepted. Nine auto-photometers for checking motor-car headlamps (£80).—Everett, Edgcumbe & Co., Ltd.

Gloucester.—Town Council. Provisionally accepted. Electrical work in the erection of a maternity hospital (£1,257).—Bective Electrical Co., Ltd.

London.—HAMMERSMITH.—Borough Electricity Committee. Accepted. Switch (£282).—Switchgear and Cowans, Ltd.

KENSINGTON. — Borough Council. Accepted. Wiring installations at communal shelters (£4,025).—Holliday & Son (Electrical), Ltd. Internal lamp fittings (£405).—Burnham & Co. External lamp fittings (£1,150).—W. Sugg & Co., Ltd.

Middlesbrough. — Town Council. Accepted. Electric lighting at further shelters.—H. G. Sproates.

Portsmouth.—Town Council. Accepted. Fire protection equipment for two transformers (£1,234).—Mather & Platt, Ltd.

Scarborough. — Electricity Committee. Accepted. Extensions at substation (£438).—Ridehalgh Bros., Ltd.

Swansea. — Electricity Committee. Accepted. Auxiliary l.v. cables for power station (£5,833).—Aberdare Cables, Ltd. Extension of hydraulic sluicing plant (£7,007).—International Combustion, Ltd.

West Hartlepool. — Town Council. Accepted. Installation of plant and laying of cable in connection with the provision of an auxiliary bulk supply of electricity at substation.—North-Eastern Electric Supply Co., Ltd.

Wigtownshire. — County Council. Accepted. Installation of electricity at Glenluce School (£52).—A. Arkley, Stranraer.

Worksop.—Town Council. Recommended. Single-panel Type C truck, as extension to the 11-kV switchboard at substation (£372).—Metropolitan-Vickers. Four-panel 11-kV sheet-steel cubicle-type switchgear (£851).—Yorkshire Switchgear and Engineering Co., Ltd.

New B.S. Publications

Motor Starters and Controllers.—In the reprint of B.S. 587, motor starters and controllers have been introduced. The most important additions are perhaps the mechanical endurance test and an appendix on clearances and creepages for motor control gear. A new definition has also been included, relating to a "damp and dust protecting model." The appendix in the 1938 edition dealing with terminal markings is replaced in the new edition by a cross-reference to B.S. 822.

Aeronautical Terms.—A revision of the 1933 edition of the British Standard glossary of aeronautical terms (B.S. 185) has been issued. It is divided into 12 sections and includes power plant, instruments and equipment and radio-communication. Symbols and notation are included as an appendix.

Testing Rubber.—In the preparation of British Standards for rubber products it became apparent that the practical co-ordination of methods of testing would be considerably facilitated by the issue of recommended methods. The tests so far standardised have been published as B.S. 902 on methods of testing latex, raw rubber and unvulcanised compounded rubber and B.S. 903 on methods of testing vulcanised rubber.

Copies of these publications can be obtained from the British Standards Institution, 28, Victoria Street, London, S.W.1, at the following prices (post free):—B.S. 587, 2s. 3d.; B.S. 185, 8s.; B.S. 902, 3s. 9d.; B.S. 903, 5s. 4d.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Angus.—Air-raid shelters for County Council (£6,500); chief constable, Forfar.

Bacup.—Public shelters; borough engineer, Town Hall.

Barrow-in-Furness.—Alternative power houses; K. L. M. Rediffusion Service, Ltd.

Batley Carr.—Extensions to warehouse; John Hardy & Son.

Bingley.—Communal shelters (£44,000), Gilstead, Cross Flats, and Ryshworth estates, for U.D.C.: surveyor, Town Hall, Bingley, Yorks.

Birmingham. — Staff accommodation, Marston Green Homes; city engineer.

Birstall.—Extensions to offices; William Holton & Sons.

Bradford.—Tunnels into hillsides for use as shelters; city engineer.

Caernarvon.—Communal centres; borough surveyor.

Carmarthen.—Pumping unit, Cwmtawel; borough engineer, John Street, Carmarthen.

Cheltenham.—Canteen; W. H. Cole & Co., Ltd.

Chapel, Uckington; C. H. Denley.

Chesterfield.—Workshop; Steel Breaking & Construction Co., Ltd.

Canteen; Sheepbridge Coal & Iron Co., Ltd.

Cumberland.—Shelters at Cargo and Kingstown Council Schools; J. H. Haughan, architect, 4, Alfred Street North, Carlisle.

Fife.—Air-raid shelters at schools (£7,160; lighting to cost £140); county architect, Cupar, Fife.

Glasgow.—Alterations at 381-389, Victoria Road, for City Bakeries, Ltd.; Arch. Hamilton, Ltd., 70, Glassford Street, Glasgow.

Additions to Mossbank school (£1,473); Ian M'Cullum.

Grantham.—Church for Methodist Union trustees; H. W. Kelhan, architect, 14, All Saints' Place, Stamford.

Horbury.—Domestic surface shelters (100). Builders: H. Smith & Son, Northfield Lane; H. Fallas & Son, Twitch Hill; and H. Hemingway, Shepstye Road; all of Horbury, near Wakefield.

Huddersfield.—Works canteen; Meltham Silica Fire Brick Co., Ltd.

Huyton.—Brick domestic shelters. Contractors: J. Lucas & Sons; J. R. Ruddock; W. J. P. Molyneux; W. B. Clare; Ebbs, Ltd.; North Western Estates, Ltd.; Randle, Wardle & Pilkington, Ltd.; and Paramount Estates, Ltd.

Kirkburton.—Public and domestic communal shelters (50); F. Hobson, surveyor, Kirkburton, near Huddersfield.

Lanarkshire. — Bombproof shelters; county architect, Albert Street, Motherwell.

Leeds.—Air-raid shelter to accommodate 2,500 people; W. S. Cameron, city engineer.

Liverpool. — X-ray building; city architect, Blackburn Chambers, Dale Street, Kingsway, Liverpool, 2.

Manchester.—Works additions and boiler house; H. S. Fairhurst & Son, architects, 55, Brown Street.

Six houses, Romney Street and Hinde Street, Moston; A. McDonald, architect, 70, Newport Road, Chorlton-cum-Hardy.

Conversion of property at Edge Lane, Chorlton-cum-Hardy, and 74, Alexandra Road, Whalley Range, into flats; Estate Department, Prudential Assurance Co., Ltd., 55, Brown Street, Manchester.

Mission Church, Woodhouse Lane, Wythenshawe; J. Gill, 14, Warwick Drive, Sale, Ches.

Alterations to factory; J. P. Bonnell, architect, 10, Holly Road, Swinton.

Alterations to premises for British Thomson-Houston Co., Ltd.; Heywood & Ogden, architects, 1, St. Peter's Street, Oldham.

Middleton.—Mill extensions for Belstaff Manufacturing Co., Ltd.; W. N. Swindells, architect, Jordangate, Macclesfield.

Morley.—Domestic communal and public shelters; F. Turner, B.Sc., borough surveyor, Town Hall.

Motherwell and Wishaw.—Domestic shelters (£40,678); burgh surveyor, Town Hall, Motherwell.

Newcastle (Staffs).—Machine shop; Smithfield Garage Co.

Newport (I. O. W.).—Extensions, St. Cross Dairy; Stratton & Millgate.

Newton-le-Willows.—Domestic communal shelters for 6,000 persons; J. Walmsley, surveyor, Town Hall, Earlstown, Newton-le-Willows.

Plymouth.—Nine wardens' posts; City Architect's Office, Guildhall, Plymouth.

Portsmouth.—Yeast drying plant; Brickwood & Co.

Police station; city engineer.

Hotel, High Street; Trust Houses, Ltd.

Rotherham.—Works extensions; J. J. Habershon & Sons, Ltd.

Works extensions; Howell & Co. Ltd.

Buildings; South Yorkshire Chemical Works, Ltd.

Rugby.—Extensions and alterations to Hospital of St. Cross; W. T. Loveday, architect, 2a, Lawrence Sheriff Street.

St. Andrews.—Reconstruction of property into flats; Ritchie, Doig & Gilchrist, solicitors.

Salford.—Scheme for building basement shelters to accommodate 20,000 persons at a cost of £240,000 approved by City Council.

Smethwick.—Boiler house; Birmingham Railway Carriage Co., Ltd.

Southall.—Factory extensions; Edgar Vaughan & Co., Ltd.

Works additions; G. Wimpey & Co., Ltd.

Staffordshire.—Public shelters at Bobbington, Ipstones, King's Bromley and Kingsley; K. L. Murray, county architect, County Buildings, Stafford.

Stirlingshire.—Extension of works for Andrews & Cameron, Ltd.

Additions to factory and office block for J. and W. Somerville; Thos. O. W. Gratton, architect, 93, Douglas Street, Glasgow.

Reconstruction of Hayston Farm, Campsie; H. M. Barker, architect, 121, West Regent Street, Glasgow.

Stretford. — Canteen; Switchgear & Cowans, Ltd.

Boiler house; G. Waterhouse & Co., Ltd.

Works extensions; Eastnor Electric Co., Ltd.

Stroud.—Central fire station; R. Bird, Rural District Council Offices, John Street, Stroud.

Tunbridge Wells.—Shelters (£29,862); town clerk, Town Hall, Tunbridge Wells.

Tyldesley.—Meat packing factory and abattoir; Co-operative Wholesale Society, Ltd., 1, Balloon Street, Manchester

Wakefield. — Public shelters; S. G. Wardley, city engineer and surveyor, Town Hall.

Walsall.—Rebuilding the "Malt Shovel," Lower Russell Street; Hughgate (Walsall) Brewery Co., Ltd.

Firemen's quarters; borough engineer.

Shelters (£38,000); borough engineer.

Wellington (Salop).—Houses for U.D.C.; J. B. Cooper, architect, 177, Corporation Street, Birmingham

West Hartlepool. — Workshop, Villiers Street for Cerebos, Ltd.; Potter and Monaghan, builders, Burn Road, West Hartlepool.

Premises for the Yorkshire Penny Bank, Ltd., Infirmary Street, Leeds.

Westmorland.—Structural alterations to buildings at Kirkby Stephen for Laundry; surveyor, County Offices, Kendal.

Whitehaven.—Houses (£50,349) and communal air-raid shelters (100); borough surveyor.

Whittington Moor (Derbyshire).—Greyhound racing track; A. Mowbray, 18, Thompson Street.